TOSHIBA

FILE NO. 330-200503

SERVICE MANUAL

DLP PROJECTOR

TDP-MT700

Document Created in Japan May.,2005

MT-700

SERVICE MANUAL

CAUTION

BEFORE SERVICING THE PROJECTOR,

READ THE SAFETY PRECAUTIONS IN THIS MANUAL.

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SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT.

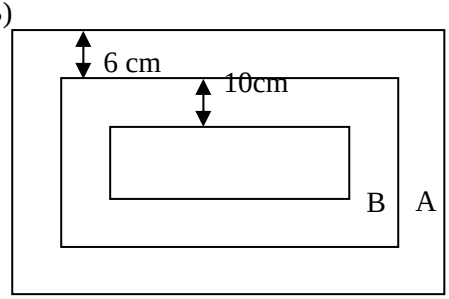
1. Safety Precautions

1. Be sure to read this manual before servicing and save it for future reference.
2. The lamp becomes extremely hot during operation. Allow the projector to cool for approximately 45 minutes prior to removing the lamp assembly for replacement. Do not operate lamps beyond the rated lamp life. Excessive operation of lamps beyond the rated life could cause them to explode on rare occasions.
3. Never replace the lamp assembly or any electronic components unless the projector is unplugged.
4. To reduce the risk of electric shock, do not disassemble this appliance. Take it to a qualified technician when service or repair is required. Incorrect re-assembly can cause electric shock when the appliance is subsequently used.
5. Do not place this product on an unstable cart, stand, or table. The product may fail, sustaining serious damage.

2. Servicing Precautions

1. When replace the lamp, be sure to avoid burns your fingers because the lamp becomes too hot.
2. Never touch the lamp bulb with a finger or anything else. Never drop it or give it a shock. They may cause bursting of the bulb.
3. This projector is provided with a high voltage circuit for the lamp. Do not touch the electric parts of power unit when turn on the projector.
4. Do not touch the exhaust fan during operation.

3. Specification

<table>
<tr><td>1.0 Optical Performance</td><td colspan="5">Tested under 52” (diagonal) image size unless other specified. Measurement Details refer to Appendix A.</td></tr>
<tr><td>1.1 Lamp</td><td colspan="5">OSRAM P-VIP 250 lamp --250W</td></tr>
<tr><td rowspan="2">1.2 ANSI Brightness(Spoke on) [Base on BenQ RD Meter CL-200]</td><td colspan="3">Minimum</td><td colspan="2">Typical</td></tr>
<tr><td colspan="3">800 Lumens</td><td colspan="2">1000 Lumens</td></tr>
<tr><td rowspan="2">1.3 Brightness Uniformity</td><td colspan="3">Minimum</td><td colspan="2">Typical</td></tr>
<tr><td colspan="3">65%</td><td colspan="2">75%</td></tr>
<tr><td>1.4 Contrast Ratio</td><td colspan="5"></td></tr>
<tr><td rowspan="2">1.4.1 ANSI Contrast</td><td colspan="3">Minimum</td><td colspan="2">Typical</td></tr>
<tr><td colspan="3">250:1</td><td colspan="2">300:1</td></tr>
<tr><td rowspan="2">1.4.2 FOFO Contrast
4X SLR ON Mode</td><td colspan="3">Minimum</td><td colspan="2">Typical</td></tr>
<tr><td colspan="3">1400:1</td><td colspan="2">1850:1</td></tr>
<tr><td>1.5 Light Leakage</td><td colspan="5"></td></tr>
<tr><td>1.5.1 Light Leakage in Active Area</td><td colspan="5">Dark level Gray 10 (linear gamma curve) not see any bright spot or line(except blemish(1.1.5))
Full white pattern test; Criteria: not see special color spot</td></tr>
<tr><td>1.5.2 Light Leakage out of Active Area</td><td colspan="5">Condition: the projection image diagonal60”
Test pattern : Full Black
Criteria: <0.25Lux outside active area.</td></tr>
<tr><td>1.5.3 Reflective Edge</td><td colspan="5">Don’t care</td></tr>
<tr><td>1.5.4 Blue Edge</td><td colspan="5">Condition: projector @ distance 3m and the projection image diagonal 100”
Test Pattern:(Factory /Pattern)
Criteria: Color coordinate |Δx,Δy | 0.01 (difference between zone A and B)
 
</td></tr>
<tr><td>1.5.5 Blemish and dust</td><td colspan="5">Reference to TI 720P Image Quality Value Specification Appendix D\table 1.</td></tr>
<tr><td>1.6 Color Coordinates
Based on BenQ RD PR650.</td><td colspan="5"></td></tr>
<tr><td rowspan="2">1.6.1 Color Temperature</td><td colspan="3">Temp</td><td colspan="2">duv</td></tr>
<tr><td>Min</td><td>Typical</td><td>Max</td><td>Min</td><td>Max</td></tr>
<tr><td></td><td>6300</td><td>8800</td><td>11500</td><td>-0.005</td><td>+0.025</td></tr>
<tr><td rowspan="2">1.6.1.1 White</td><td colspan="3">x</td><td colspan="2">y</td></tr>
<tr><td colspan="3">284 ± .03</td><td colspan="2">308 ± .03</td></tr>
<tr><td>1.6.1.2 Red</td><td colspan="3">.650 ± .03</td><td colspan="2">.330 ± .03</td></tr>
<tr><td>1.6.1.3 Green</td><td colspan="3">.330 ± .03</td><td colspan="2">.550 ± .03</td></tr>
<tr><td>1.6.1.4 Blue</td><td colspan="3">.140 ± .03</td><td colspan="2">.055± .03</td></tr>
<tr><td>1.7 Color Uniformity</td><td colspan="5">Duv</td></tr>
</table>

1.7.1 White	0.020	
1.7.2 Red	0.033	
1.7.3 Green	0.020	
1.7.4 Blue	0.020	
1.7.5 Dark	0.030	
2.0 Image Quality		
2.1 Throw Ratio	102” ±5% Diagonal at 3m (Wide)	
2.2 Zoom Ratio	>1.35:1	
2.3 Distortion		
2.3.1 Horizontal TV Distortion	<1.0%	
2.3.2 Vertical TV Distortion	<1.0%	
2.3.3 E.F.L.	23.983 ~ 32.433	
2.4 Projection Offset	100%	
2.5 Mechanical Focus Range	1.6~8 m (Details refer to Appendix A16)	
2.6 Focus		
2.6.1 ☒ Pattern (Base on limit sample, Test condition: Viewer stand at 3m far from the screen)	Distance 3.0m 100” for Focus test. (Tele @ the same Throw Distance.) (1)If uniformly focused, than pass. (2)If critical to judge, check item 2.6.2 (flare and defocus) Test pattern: pattern 84(Chroma)	
2.6.2 Flare and Defocus	Flare (B) R <=3 G<=3 B<=3.5	Defocus (A) R<=2.5 G<=2 B<=2
2.7 Lateral Color	Test pattern: pattern 34(Chroma) Criteria: <1 pixels	
2.8 DMD Image Quality	Dark pixels<=3, bright pixels =0 (See Appendix D)	
3.0 Mechanical Specification	In detail refer to C510	
3.1 Dimensions	366 x 311 x 136 mm (L x W x H)[including adjust foot]	
3.2 Weight	5.65±0.05Kgs	
3.3 Security Slot	Kensington compatible slot 150N break away force	
3.4 Lens Cover	YES	
3.5 Feet	Two adjustable front foot for tilt 0~6°.	
4.0 Packaging	Detail refer to C309 (Packing Description)	
4.1 Outside Dimensions	537 x 520 x 260 mm (L x W x H)	
4.2 Weight	9.7 ±0.05Kgs (Including Accessories, Projector)	
4.3 Palletization	1140 x 1050 x 120 mm	
5.0 Thermal Specification	Maximum temperature (Ambient Deg.：5~40)	
5.1 Handles,Knobs,grips.etc. and surface Held or touched for short periods only.	Metal:60°C Pastic:85°C Bottom Surface: Metal: 55°C;Plastic : 70°C **@25** °C	
5.2 External Surface which maybe tounch	Metal:70°C ; Plastic:95°C	
5.3 Exhaust Air	95°C	
6.0 Environmental	Adhere to Appendix B	
6.1 Temperature	Operating	5 ~ 40°C, without condensation
	Storage	-10 ~ 60°C, without condensation
6.2 Humidity	Operating	10 ~90%RH, without condensation
	Storage	10 ~ 90%RH, without condensation
6.3 Audible Noise Level (sea	Typical	High mode: 31dBA @ 25°C

level)		Standard mode: 28dBA @ 25°C
	Maximum	High mode: 32dBA @ 25°C Standard mode: 29 dBA @ 25°C
6.4 Altitude	0-5999 feet at 30°C 6000-10000 feet at 23°C test 6000 feet above sea level@ 30°C & 10000 feet above sea level@ 23°C only Final data to be confirmed at C3 stage around mid of Nov.	
6.5 Shock	Non-operating, 50g, 20ms half-sine, all primary axis, 1 shock per orientation, total of 3 shocks	
6.6 Drop	76cm . Refer to Appendix B	
6.7 Vibration	Refer to Appendix B	
7.0 Regulatory	Safety	CSA compliance: UL60950 TUV compliance: EN60950 CB Report:IEC60950
	EMC	FCC : FCC Part 15B and ICES-003 EMC: 89/336/EEC CE Mark : EN 55024, EN 55022, EN 61000-3-2, EN 61000-3-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11 C-Tick
	ESD	Criteria B . Refer to Appendix B
8.0 Reliability		
8.1 MTBF	20000 hours except for DMD chip , lamp , Fans and Color Wheel.	
8.2 Lamp Lifetime	Typical : 2000 hours (50% brightness maintenance)	
9.0 Power Requirements	Adhere to Appendix F	
9.1 Power Supply (Normal)	VAC 100 – 240 Auto-switch (50/60Hz), 3 Wire Grounded	
9.2 Power Consumption	Max	385W
	Standby	15W
9.3 Power Connector	Comply with safety regulation	
10.0 Panel Specification		
10.1 Type	Single Chip 0.8” 12° tilt DMD (720P) from Texas Instruments (720P DMD Front Projection Image Quality Specification described in Appendix D)	
10.2 Resolution	1280(H) x 720(V)	
10.3 Color Depth	16.78 million colors	
11.0 Compatibility		
11.1 PC	PC Compatible VGA, SVGA, XGA	
11.2 Video Signal	Composite, S-Video, $Y/C_B/C_R$	
11.3 HDTV	DTV $Y/P_B/P_R$, DTV RGBHD (480P, 576P, 720P,1080i)	
11.4 Image Inversion	Floor Front, Floor Rear, Ceiling Front, Ceiling Rear	
11.5 Scaling	Scaling from other resolutions to native by O-plus™ scaling chip	
11.6 Aspect ratio	Full, 4x3, Zoom, Theater Wide ,Through	
12.0 Image Interface		

12.1 D-Sub RGB Input	None
12.2 Composite	RCA x 1
12.3 S-Video	S-Video x 1
12.4 Component	RCA x 3
12.5 Progressive component and DTV RGBHV	BNC x 5
12.6 Digital Video	HDMI
13.0 Control Interface	
13.1 IR Receiver	2 receiver (Front and Rear)
13.2 Serial Input	8 pin Mini-Din (Female) x 1 , Base on RS-232 Standard (refer to Appendix G)
13.3 USB Connector	None
14.0 User Interface	
14.1 Backlight	None
14.2 Operator Keypad	8 Key
14.3 Indicators	Lamp and Temp indicator is red , Power indicator is Red and Green.
14.4 Electric Keystone Correction	± 12°
14.5 Onscreen Menu	Should be in 7 languages (English, French, German, Italian, Spanish, Portuguese and Japanese)
14.6 Color temperature	
Lamp Native	Lamp Native
Warm	6500°K (x=0.315,y=0.315)
Middle	8500°K (x=0.296,y=0.316)
Cool	9300°K (x=0.280,y=0.300)
User 1	Default same Middle color temperature
User 2	Default same Middle color temperature
15.0 Audio	
15.1 PC Audio Input	None
15.2 Speaker	None
16.0 Accessories	
16.1 Cables	Power Cord Set (US, UK, Euro -------depend on Area) x 1,
16.2 Printed Matter	User's manual (English, French, German, Italian, Spanish , Japanese Portuguese and Swedish)
16.3 Remote Control	IR Remote x 1, AAA Batteries x 2

4. Circuit Operation

4.1. System Block Diagram

MT700 consist of the connector, main, chip board. The connector board provides the input terminal and RS-232 for service ,video input(Composite, S-video, YcbCr) and graph input(RGB BNC , Y Pb Pr). The main board provides the A/D converter for the graph input (HDMI, RGB BNC, YPbPr) and decoder function for the video input. That supports also the scaler and color process function. For the interlace video, the board supports the de-interlace function. Besides, the boards provide the color wheel driver ,the lamp enable functions and DMD chip control function.

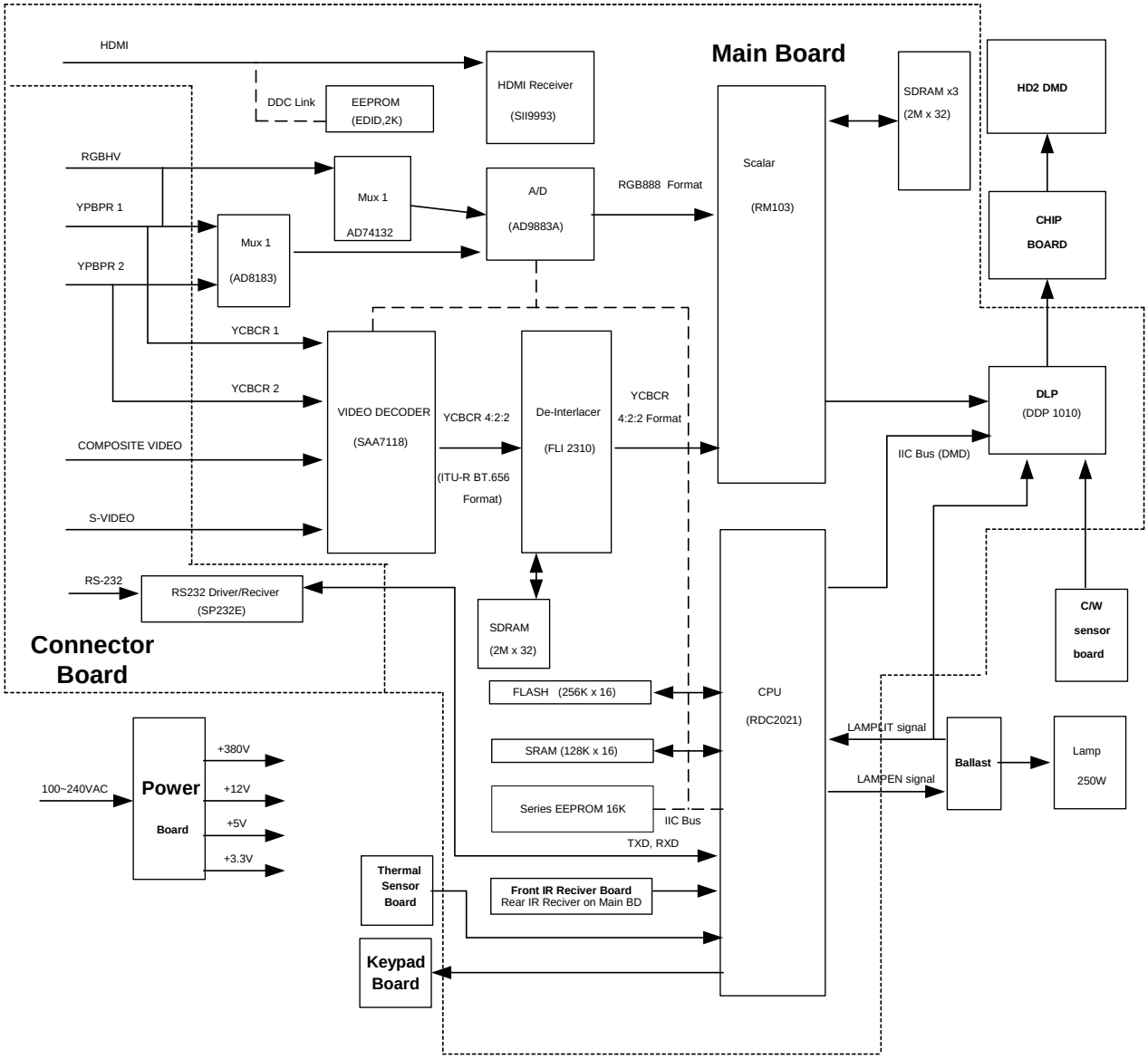
This video projector can accept the following six kinds of input sources:

(1) HDMI
(2) RGBHV
(3) Component 1
(4) Component 2
(5) S-Video
(6) Composite

As shown in the system block diagram, there are seven boards in the system. They are:

(1) Main Board
(2) DMD Chip Board
(3) Thermal Sensor Board
(4) Color Wheel Sensor Board
(5) Keypad Board
(6) Ballast
(7) Power board
(8) IR board

In the main board circuits, it contains AD converter (AD9883), HDMI receiver (SII9993), Video decoder (SAA7118), de-interlace processor (FLI2310), Scalar (OPLUS RM-103) and CPU (RDC2021).


Main Board
HDMI
DDC Link
EEPROM
(EDID,2K)
HDMI Receiver
(SII9993)
SDRAM x3
(2M x 32)
HD2 DMD
RGBHV
YPBPR 1
YPBPR 2
Mux 1
AD74132
Mux 1
(AD8183)
A/D
(AD9883A)
RGB888 Format
Scalar
(RM103)
CHIP
BOARD
YCBCR 1
YCBCR 2
VIDEO DECODER
(SAA7118)
YCBCR 4:2:2
(ITU-R BT.656
Format)
De-Interlacer
(FLI 2310)
YCBCR
4:2:2 Format
DLP
(DDP 1010)
IIC Bus (DMD)
COMPOSITE VIDEO
S-VIDEO
RS-232
RS232 Driver/Reciver
(SP232E)
SDRAM
(2M x 32)
C/W
sensor
board
Connector
Board
FLASH (256K x 16)
CPU
(RDC2021)
SRAM (128K x 16)
LAMPLIT signal
LAMPEN signal
Ballast
Lamp
250W
100~240VAC
Power
Board
+380V
+12V
+5V
+3.3V
Series EEPROM 16K
IIC Bus
TXD, RXD
Thermal
Sensor
Board
Front IR Reciver Board
Rear IR Reciver on Main BD
Keypad
Board

4.1.1. Main Board

4.1.1.1. Overview

1. The Main Board includes five input connectors. They are HDMI input, component 1 input, component 2 input, S-video input, composite video input, RGBHV input and download connector.
2. The Graphic port input includes (1) HDMI input connector, (2). Component YPBPR1 and (3). Component YPBPR2. (4). RGBHV connector.

   The HDMI input connector can accept digital RGB or YUV format signals. This input can support 480p, 576p, 720p, 1080i video signals.

   The Component 1 and Component 2 can accept analog YPBPR (480p, 576p, 720p, 1080i) signals.

   Because a HDMI decoder (SII9993) is used, this projector also can decode HDCP signals.

3. The Video port inputs (included Component YCBCR1, Component YCBCR2, S-video and Composite video) will be processed by the video decoder (SAA7118), then processed by the de-interlace processor (FLI-2310).

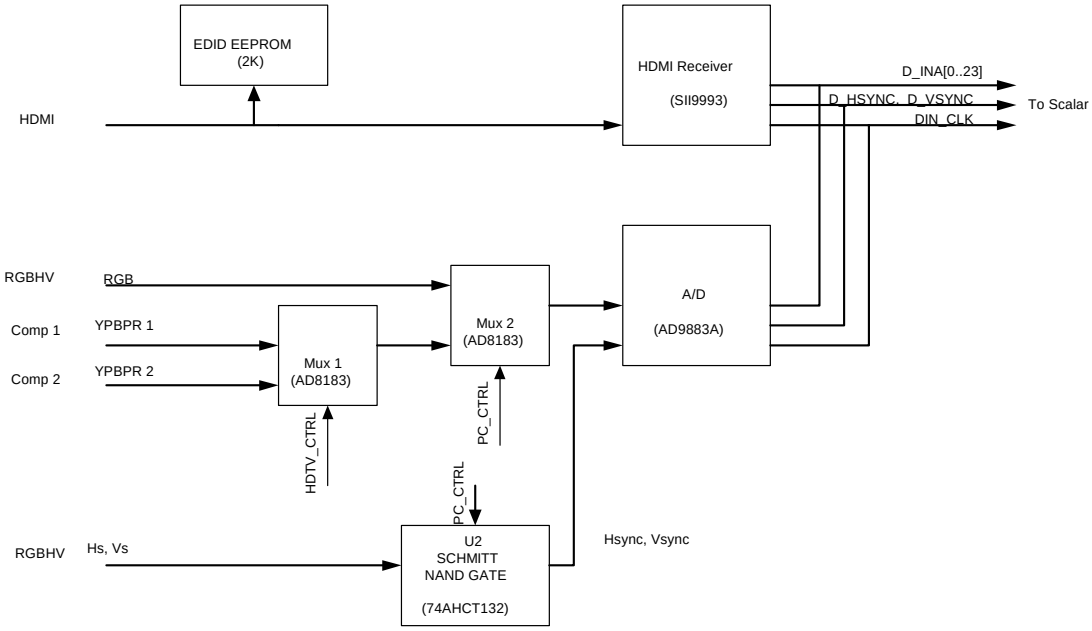
   If YCBCR signals (480i, 576i) is selected at Component 1 or Component 2 inputs, the input signals will go to video decoder automatically.

   The S-Video and Composite video inputs can accept NTSC, PAL, SECAM signals.

4. Both graphic and video port signals will be processed by the scalar (Oplus RM-103). The scalar will convert input signals into RGB 8:8:8, 24-bit signals by downscaling or up-scaling.

4.1.1.2. Graphic Port Input circuit

1. Mux is high bandwidth multiplexers (AD8183). The Mux select YPBPR1 or YPBPR2 by controlling HDTV_CTRL signal. The output of Mux will go to AD9883A.
2. A/D-decoder (AD9883A) is used for decoding RGB or YPBPR analog signals to digital signals (RGB 8:8:8) which provide 24 bit true color resolution.
3. A Schmitt NAND gate (74AHCT132) is used to accept TTL Hsync and Vsync signals. This projector can support separated (H/V) and composite (H+V) sync signals. It doesn't support SOG signal.
4. HDMI Receiver (SII9993) can support HDMI signals. It supports HDTV signals up to 720p/1080i resolutions.
5. The EDID EEPROM is used to store the EDID data, included PC and Video timings. The PC and HDCP video player will read the EEPROM data via EDID link in the DVI-I connector.



Graphic Port Input Circuits

4.1.1.3. Video port input circuit

1. Video decoder SAA7118:

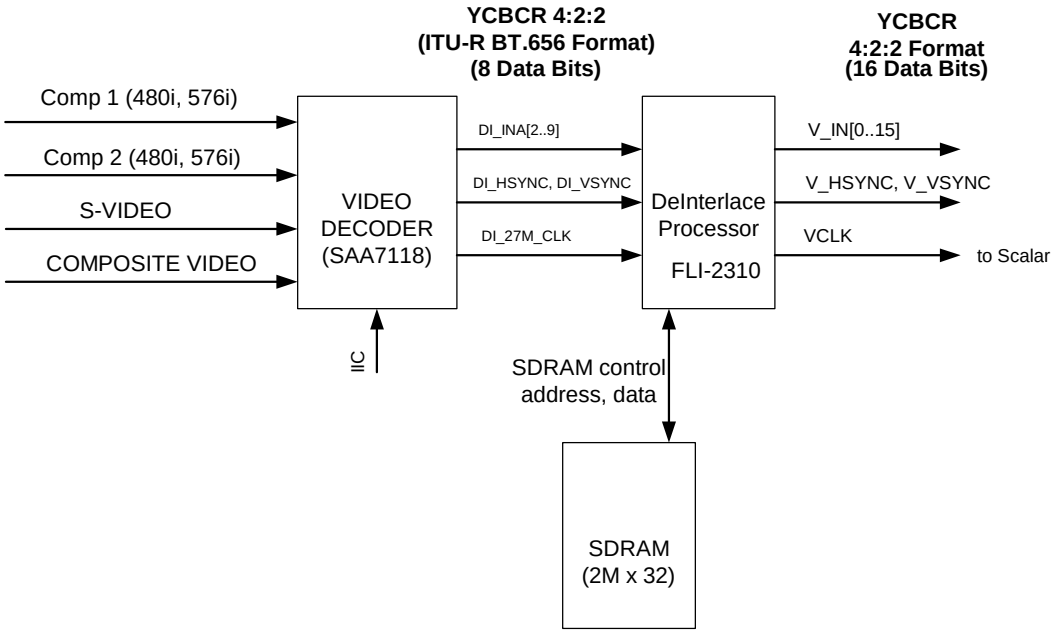
   The video decoder can accept 480i, 576i via component 1 and component 2 input connectors. It also supports NTSC M, NTSC-J, PAL (included PAL M, PAL N), and SECAM via S-Video connector and composite video connector.

   This decoder will decode video inputs to ITU-R BT.656 digital format (DI_IN[2.9]). The interlacing digital video outputs DI_INA[2..9] will go to de-interlace processor FLI-2310.

2. De-interlace Processor FLI-2310:

   The de-interlace processor accepts parallel digital ITU-R BT.656 data with H/V sync. The output format is YCBCR 4:2:2 (V_IN[0..15]). This output is progressive output with 31.5K Hsync and 27MHz pixel clock.

   The SDRAM (2M x32) U11 is needed when FLI-2310 converts interlace video input to progressive video output.



Video Port Input Circuit

4.1.1.4. Scalar and Micro-controller

1. CPU (RDC2021) 25Mhz

   This CPU is used for controlling whole electronic boards and peripheral devices (thermal control and IR receiving). For essential calculation and storage, it has been set up with SRAM (128K x16), Flash ROM (256K x16) and EEPROM. The SRAM is responsible for calculation. Flash is stored the system software.

2. Scalar Rembrandt-103

   Rembrandt-103 can process dual channel data: graphic port and video port data. It receives data with YCBCR 4:2:2 (video input) as well as RGB 8:8:8 (graphic input). Rembrant-1's processing also needs to install 3 set of SDRAM.

3. EEPROM

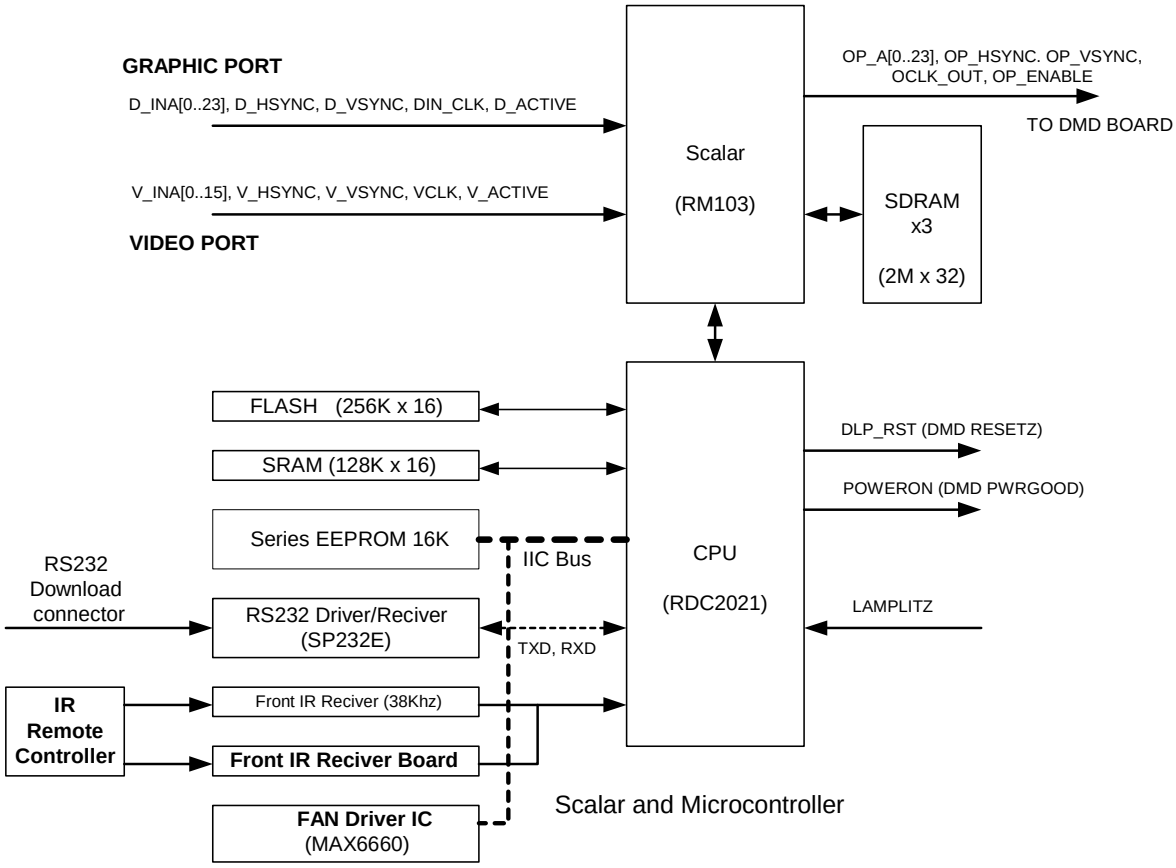
   The series EEPROM (AT24C128, 128k) stores the system information, included factory and user data.

4. RS232 Driver/Receiver

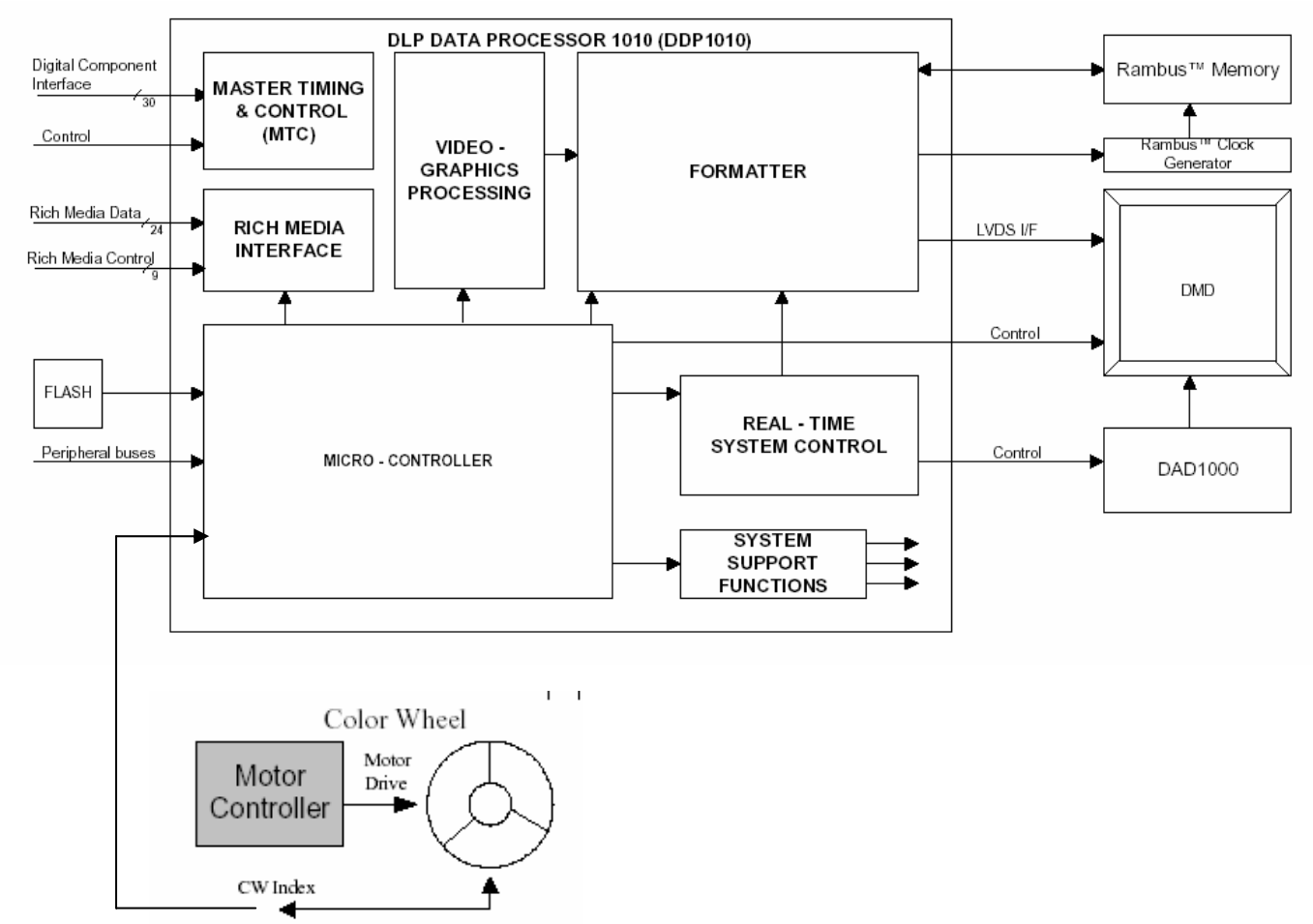
   This projector can use RS232 download connector to download new software or control this projector by RS232 commands. The RS232 Driver/Receiver is used to drive / receive RS232 signals between CPU and download connector.

5. IR receiver:

   The front IR receiver accepts IR signal from front side direction. The carrier frequency is 38kHz.



4.1.2. DLP Processor



1. DLP data processor DDP1010:

   The function block of DDP1010 includes video graphic processing, micro-controller, formatter, real-time control and system support function. DDP1000 accepts RGB 4:4:4 signals from the scalar, and formats the signals into XGA DMD acceptable signals.

   DDP1000 is designed to work in conjunction with a single 128Mbit RDRAM and an associated Direct Rambus Clock Generator (DDWG) chip

2. Flash:

   The micro-controller of DDP1010 operates entirely from a single external Flash device (U4). The Flash device provides micro-code, configuration parameters and PWM sequences.

3. DMD Reset Driver DAD1000:

The DAD1000 will generate DMD reset signals MBRST[0..15] as well as VCC2 (7.5V) for DMD chip.

4. Motor Controller SH6742:

   The DDP1010 electronics support driving three phase, 12 poles, Y configuration, brushless DC color wheel motor. The DDP1010 electronics use a combination of back EMF from motor and the CWINDEX signal to frequency and phase lock the color wheel revolution to 2.5 times of VSYNCZ rate.

4.1.2.1. Fan control

In this projector, there are four fans for cooling the system.

i. Fan 1 (Main Fan): for cooling the lamp, light pipe and color wheel
ii. Fan 2 (Blower): for cooling the lamp,
iii. Fan 3 (Power Fan): for cooling the power module and ballast
iv. Fan 4 (DMD Fan): for cooling the DMD chip

1. Fan controller MAX6660:

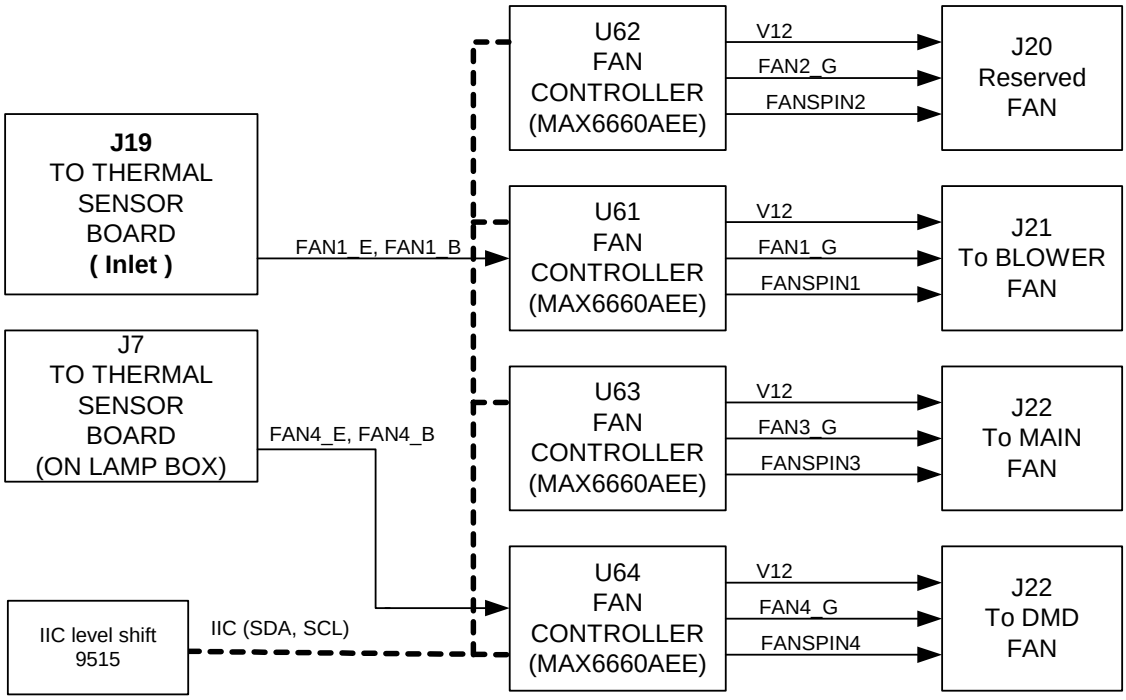
   The four fan controllers are used for controlling the four fans independently. Each fan has a FANSPIN output to each fan controller. The fan controller can use this signal to detect if the fan is spinning or not. If the fan stops, the CPU will turn off the DMD RESETZ and PWRGOOD signals, then the DMD system and Lamp will be turned off.

2. Thermal sensor on lamp box:

   The thermal sensor on the lamp box is used for detecting temperature around the Lamp box.

3. Intake thermal sensor:

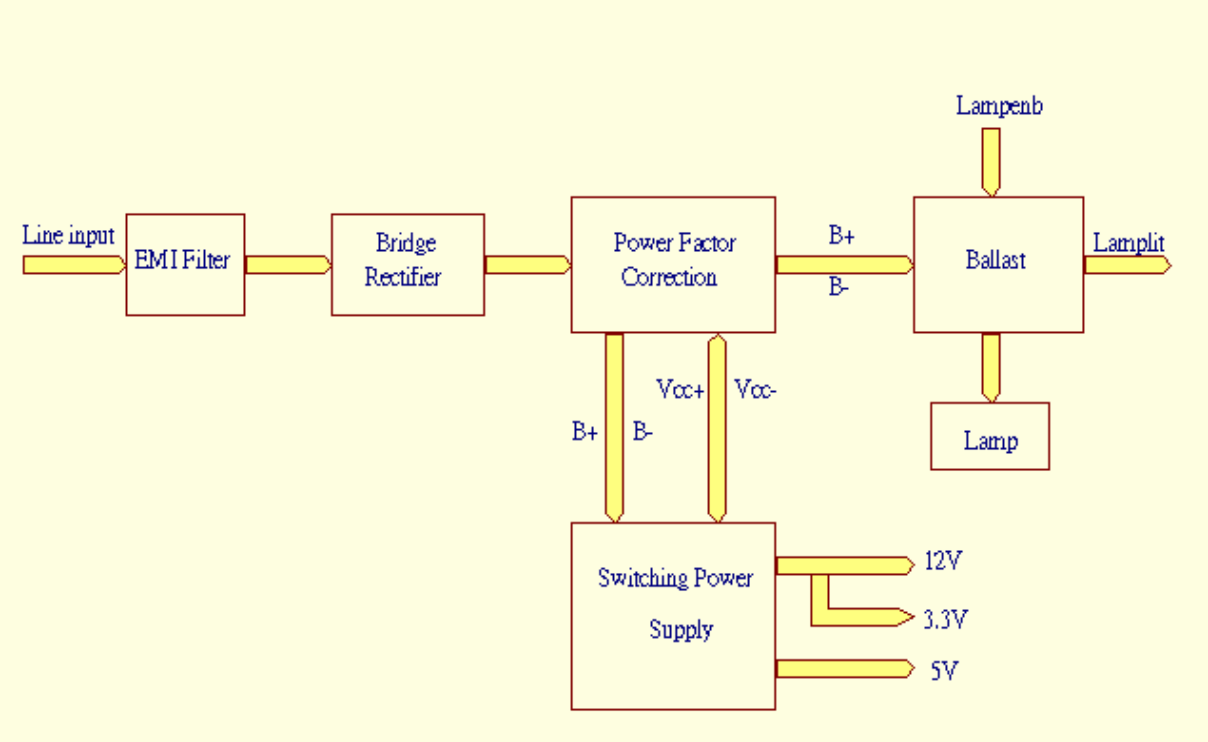
   The intake thermal sensor will sense the intake temperature. The CPU will read temperature from the fan controller. The CPU will compare temperature of lamp box sensor and temperature of intake sensor, then control the speed of fans. If temperature is out of limit, the CPU will turn off the projector system.



FAN Control Block

4.1.3. Power Supply Circuits

4.1.3.1. Block Diagram



4.1.3.2. General specification

Input voltage : AC 90~264V

Input Frequency: 47~63Hz

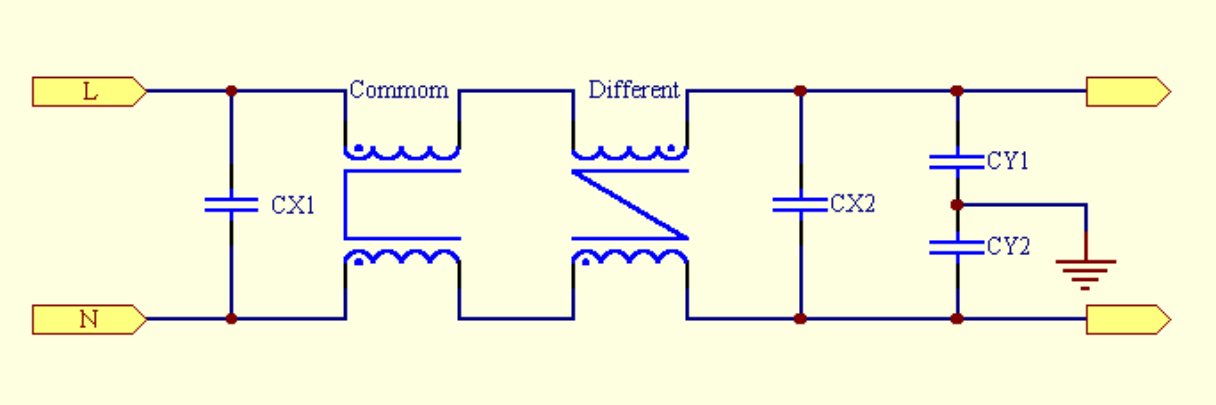
Input power: 330W max

The power circuit shall supply DC power outputs as followings:

Output	Nominal		MAX. Load Current	
1	375	V	0.7	A
2	12	V	0.8	A
3	3.3	V	1.5	A
4	5	V	0.8	A

4.1.4. Circuit Operation Theorem

4.1.4.1. EMI filter



EMI components have CM inductor,DM inductor,CX1,CX2,CY1, and CY2

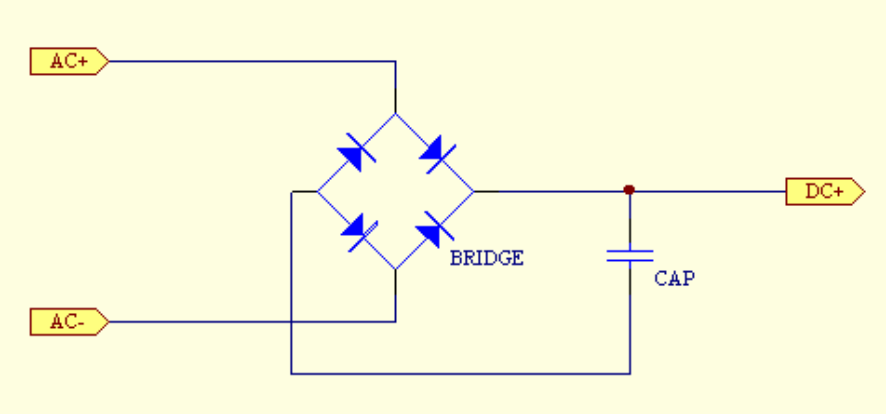
1. CM inductor:To be used the High μ Ferrite core,and the inductance is high (~mH or more 10mH)

2. DM inductor:To be used the low μ Iron poweder core ,and the inductance is lower(10uH or more 100uH)

3. X capacitor :To be placed between L and N,and the capacitance is usually 0.1uF to 1uF

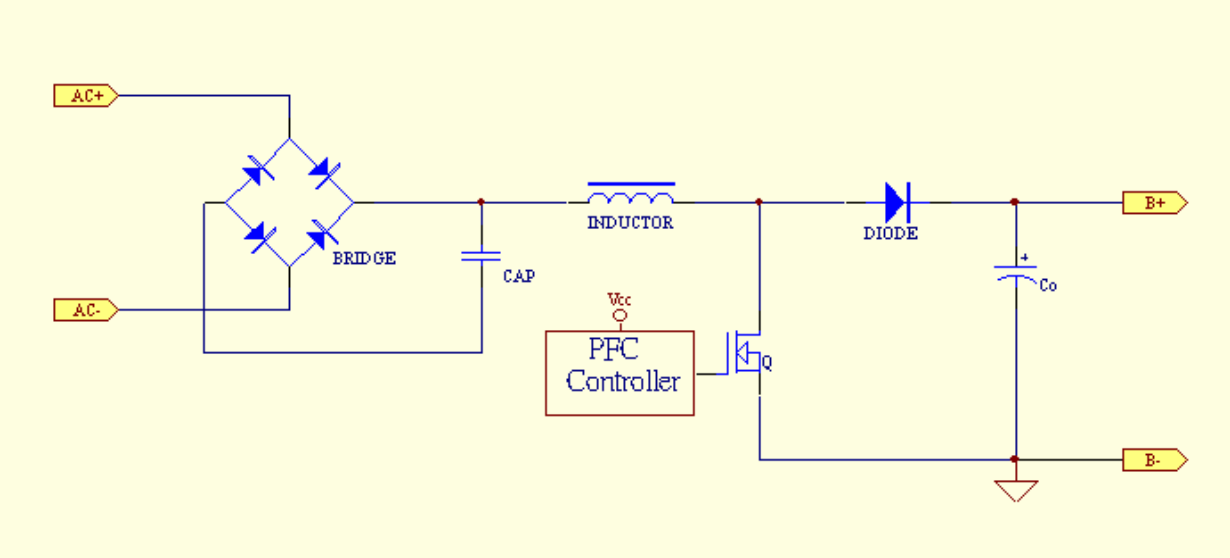
4. Y capacitor :To be placed L-G and N-G ,and we often pair the CY1,and CY2 for EMI

4.1.4.2. Bridge rectifier and filter



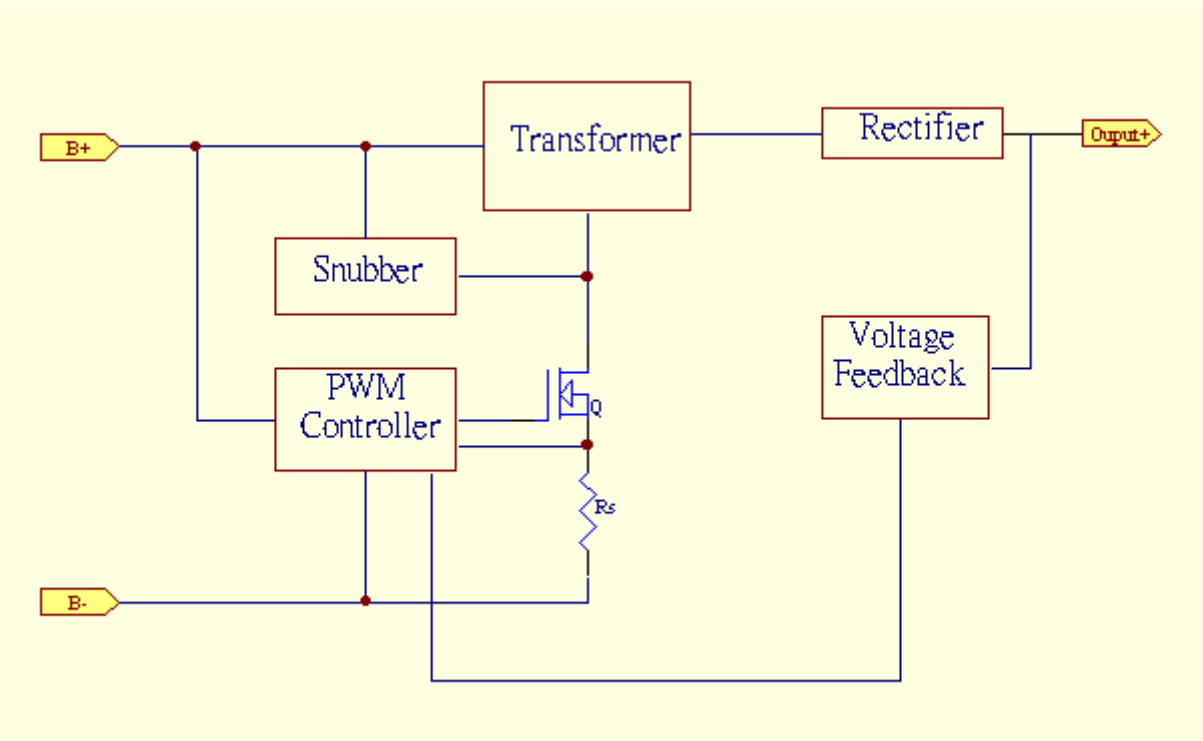
Bridge convert the AC input into DC output ,and the CAP is AC filter.

4.1.4.3. Power Factor Correction

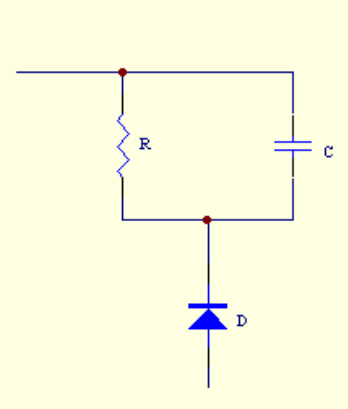


The Power Factor Correction (PFC) like a Boost converter . The AC mains voltage is rectified by a bridge and the rectified voltage delivered the the boost converter . This using a switching technique ,boost the recdtified input voltage to a regulated DC output voltage Vo . The boost converter consists of a boost inductor (L) , a controlled power switch (Q) , a catch diode (D) , an output capacitor (Co) ,and a PFC controller . PFC's goal id to shape the input current in a sinsoidal fashion , in-phase with the input sinusoidal voltage .

4.1.5. SPS BLOCK DIAGRAM

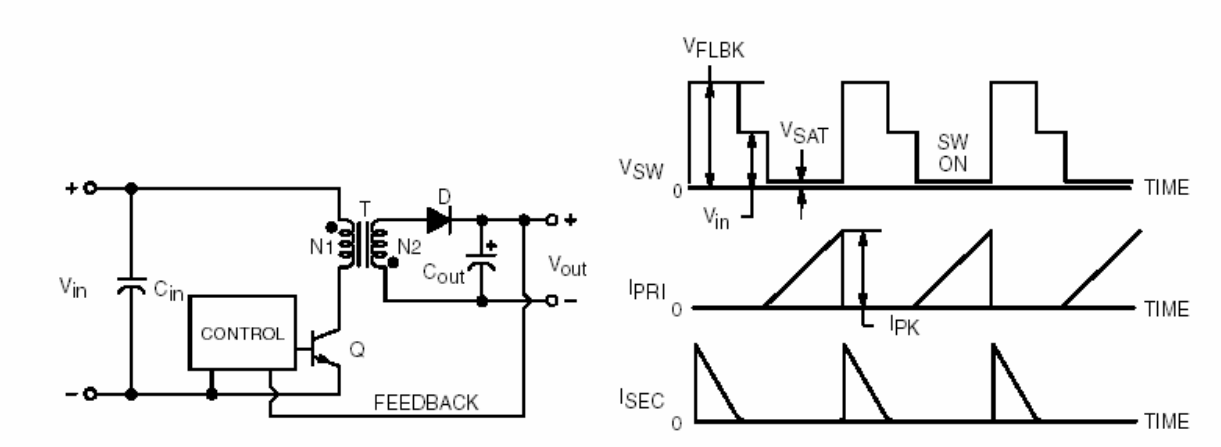


4.1.5.1. Snubber circuit



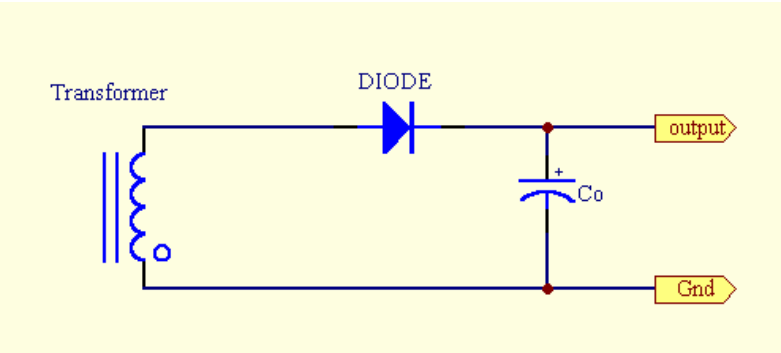
The snubber circuit, which is reduce the spike voltage .This had its benefits in the Safe Operating Area (SOA) of the semiconductors ,and it lowers the spectral content if any radiated RFI thus radiating less RF energy.

4.1.5.2. Flyback Circuit



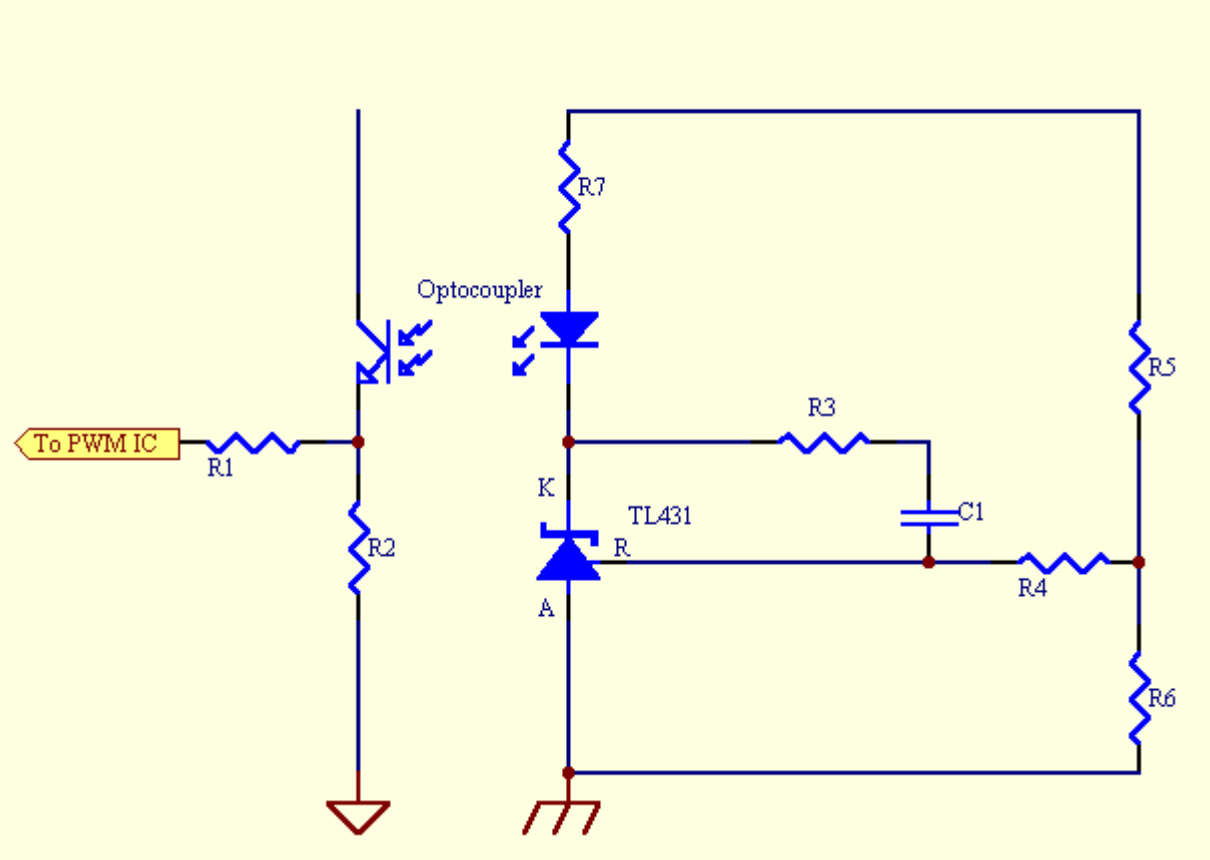
In a flyback converter operated in the discontinuous mode, the energy stored in the flyback transformer must be zero at the beginning and end of each swiching period. During the on-time energy is stored in the transformer and energy taken from the transformer when the switching transistor turn-off, the stored energy is all delivered to the output.

4.1.5.3. Rectifiers Circuit



Choosing the best rectifiers for any switching power supply design is an important process. The rectifiers are the largest source if loss within switching power supplies. To choose the best rectifier, one must understand the parameters that affect their efficiency. The most important rectifier parameters are the forward voltage (Vf) and the reverse recovery time. The forward voltage drop creates a loss just by having voltage across the device while high currents are flowing through it. And the shortest reverse recovery time will be minimized the loss.

4.1.5.4. Voltage Feedback



The seconddary referenced error amplifier control system is implemented with the TL431. The device consists if an accurate 2.5V reference, error amplifer a, and driver. The output voltage is sensed , diveded by R5 and R6 ,and applied to the inverting of the error amplifier is internally connected to the reference voltage . The frequency response of the error amplifier is determinde by the compensation network cinsisting of R3 an C1, and the high frequency gain setting R4. The optocouple diode current is limited by R7. the optocoupler drives the error signal into the feedback pin of PWM IC.

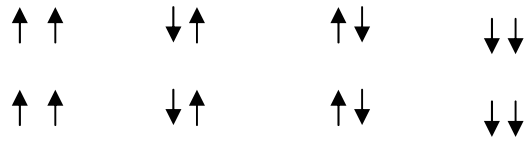
5. Alignment Procedure

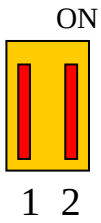
5.1. DMD Bias Voltage Alignment

- Check the Label on DMD Chip
  Ex : 5954604 – **2118C** (Four Types B,C,D,E)

- Switch the DIP Switch on DMD Board according to the Red character

B:	C:	D:	E:	(XGA)
A:	B:	C:	D:	(SVGA)





5.2. Color Wheel Delay Alignment

5.2.1. Process

Enter the Factory mode “DLP” ➔ “Color wheel delay” menu and input 32 gray red pattern to projector. To adjust color wheel delay value until all 32 gray red color is correct. (Simple method not accuracy)

When user leave the OSD menu, the setting will be automatically saved into memory.

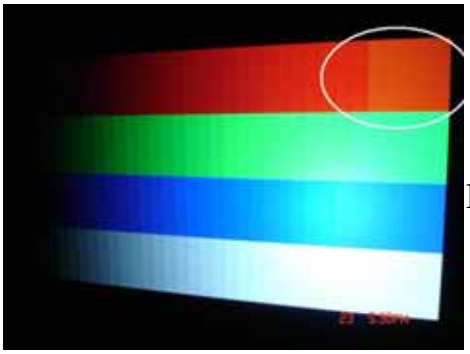
5.2.2. Use RS232

Code	Function	Comment
Z011	User brightness	User's picture settings
Z012	User contrast	User's picture settings
Z013	User intensity	User's picture settings
Z014	User color	User's picture settings
Z015	User tint	User's picture settings
Z016	User sharpness	User's picture settings
Z017	Color temperature	User's picture settings
Z018	User ICC-R	User's picture settings
Z019	User ICC-G	User's picture settings
Z020	User ICC-B	User's picture settings
Z021	User ICC-Y	User's picture settings
Z031	Sleep timer	Timers
Z032	OSD timer	Timers
Z033	Burn-In timer	Timers
Z036	OSD position - Horizontal	OSD position
Z037	OSD position - Vertical	OSD position
Z041	RGBHV input -- Red offset	Graphic signal adjustment
Z042	RGBHV input -- Green offset	Graphic signal adjustment
Z043	RGBHV input -- Blue offset	Graphic signal adjustment
Z044	RGBHV input -- Red gain	Graphic signal adjustment
Z045	RGBHV input -- Green gain	Graphic signal adjustment
Z046	RGBHV input -- Blue gain	Graphic signal adjustment
Z047	Graphic signal setup	Graphic signal adjustment
Z048	YPbPr input -- Brightness	Graphic signal adjustment
Z049	YPbPr input -- Contrast	Graphic signal adjustment
Z050	YPbPr input -- Pb gain	Graphic signal adjustment
Z051	YPbPr input -- Pr gain	Graphic signal adjustment

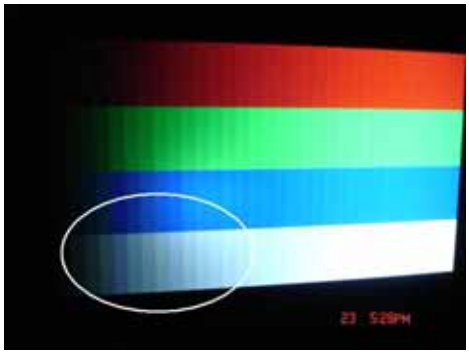
Z052	YPbPr input -- Pb offset	Graphic signal adjustment
Z053	YPbPr input -- Pr offset	Graphic signal adjustment
Z054	Frequency	Graphic signal adjustment
Z055	Phase	Graphic signal adjustment
Z056	Horizontal postion	Graphic signal adjustment
Z057	Vertical position	Graphic signal adjustment
Z058	Clamp placement	Graphic signal adjustment
Z059	Clamp duration	Graphic signal adjustment
Z060	Pre-coast	Graphic signal adjustment
Z061	Post-coast	Graphic signal adjustment
Z062	SOG threshold	Graphic signal adjustment
Z063	Overscan rate	Graphic signal adjustment
Video Signal		
Z071	Video signal setup	Video signal adjustment
Z072	CVBS & S-Video brightness	Video signal adjustment
Z073	CVBS & S-Video contrast	Video signal adjustment
Z074	CVBS & S-Video color	Video signal adjustment
Z075	CVBS & S-Video tint	Video signal adjustment
Z076	CVBS & S-Video sharpness	Video signal adjustment
Z077	Component brightness	Video signal adjustment
Z078	Component contrast	Video signal adjustment
Z079	Component color	Video signal adjustment
Z080	Component U-offset	Video signal adjustment
Z081	Component V-offset	Video signal adjustment
Z082	Overscan rate	Video signal adjustment
Z101	Gamma--Red	Gamma correction
Z102	Gamma--Green	Gamma correction
Z103	Gamma--Blue	Gamma correction
Z104	Gamma gain -- Red	Gamma correction
Z105	Gamma gain -- Green	Gamma correction

Z106	Gamma gain -- Blue	Gamma correction
Z107	Gamma offset -- Red	Gamma correction
Z108	Gamma offset -- Green	Gamma correction
Z109	Gamma offset -- Blue	Gamma correction
Z121	DLP Contrast -- Red	Gamma correction
Z122	DLP Contrast -- Green	Gamma correction
Z123	DLP Contrast -- Blue	Gamma correction
Z124	DLP Brightness -- Red	Gamma correction
Z125	DLP Brightness -- Green	Gamma correction
Z126	DLP Brightness -- Blue	Gamma correction
Z127	DLP Color Wheel delay	DLP correction
Z128	DLP Degamma Table	DLP correction
Z129	DLP White Peaking	DLP correction

5.2.3. The normal point



Lower



Higher

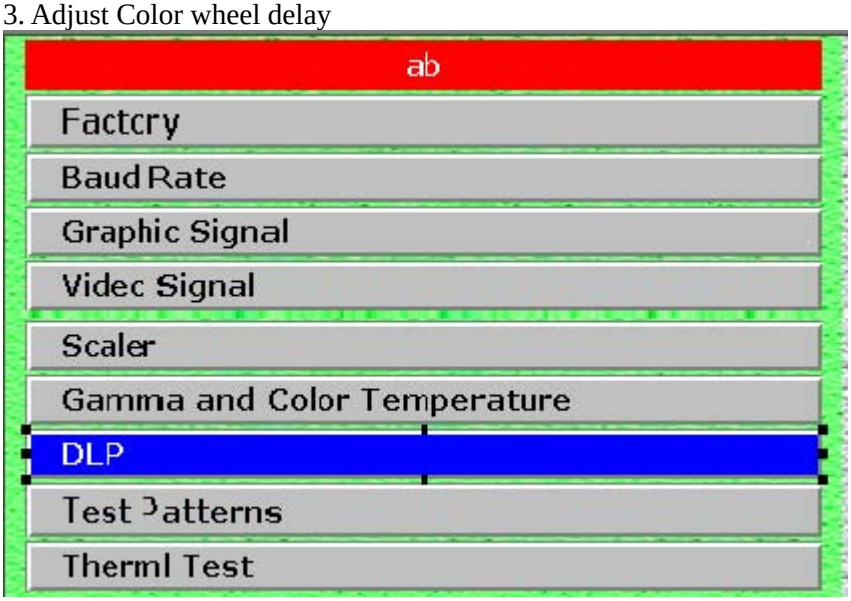
Normal

5.2.4. MT700 Color Alignment

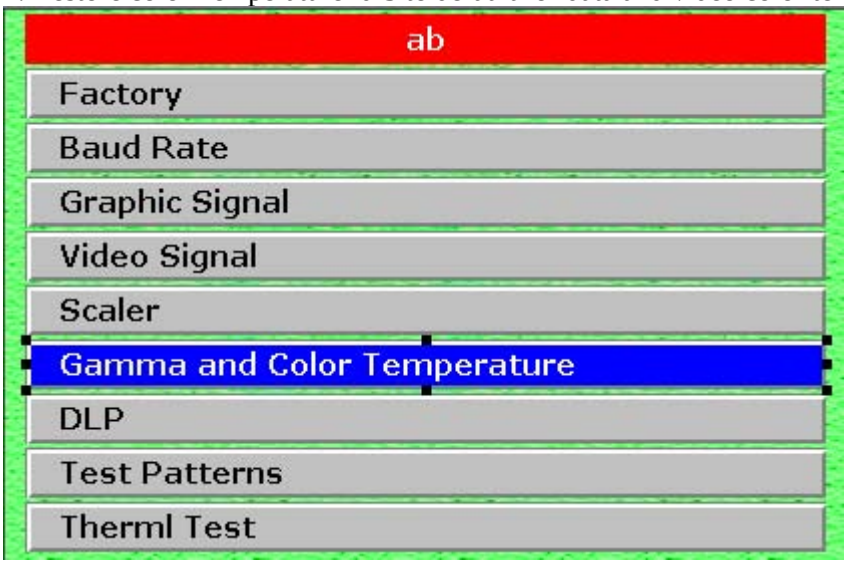
1. Load All User default

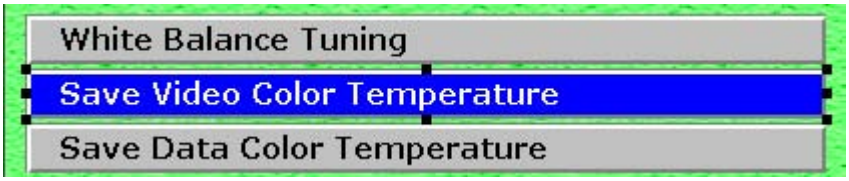
2. Load Factory default

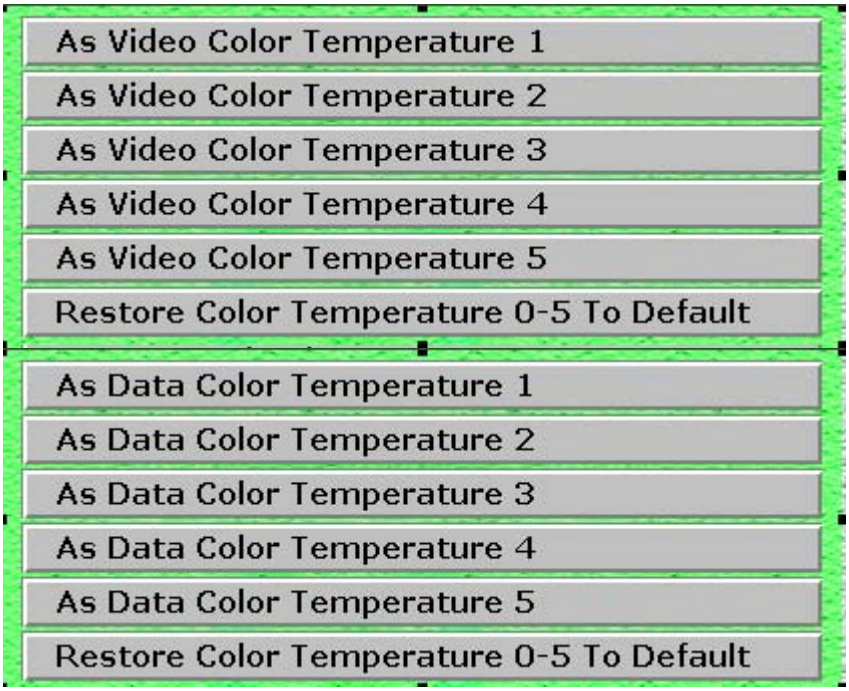
3. Adjust Color wheel delay



4. Restore color Temperature 0-5 to default for data and video color temperature



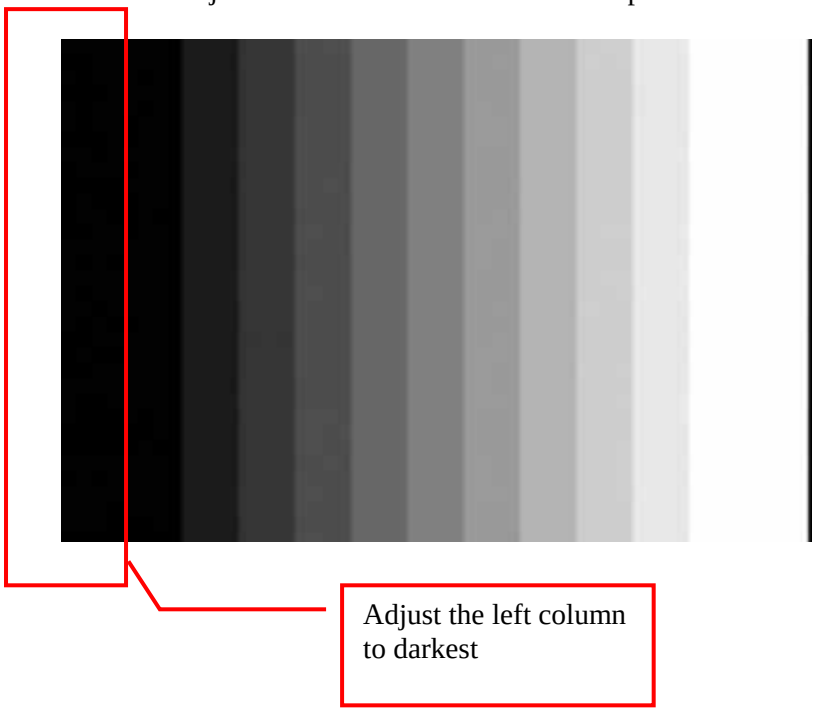


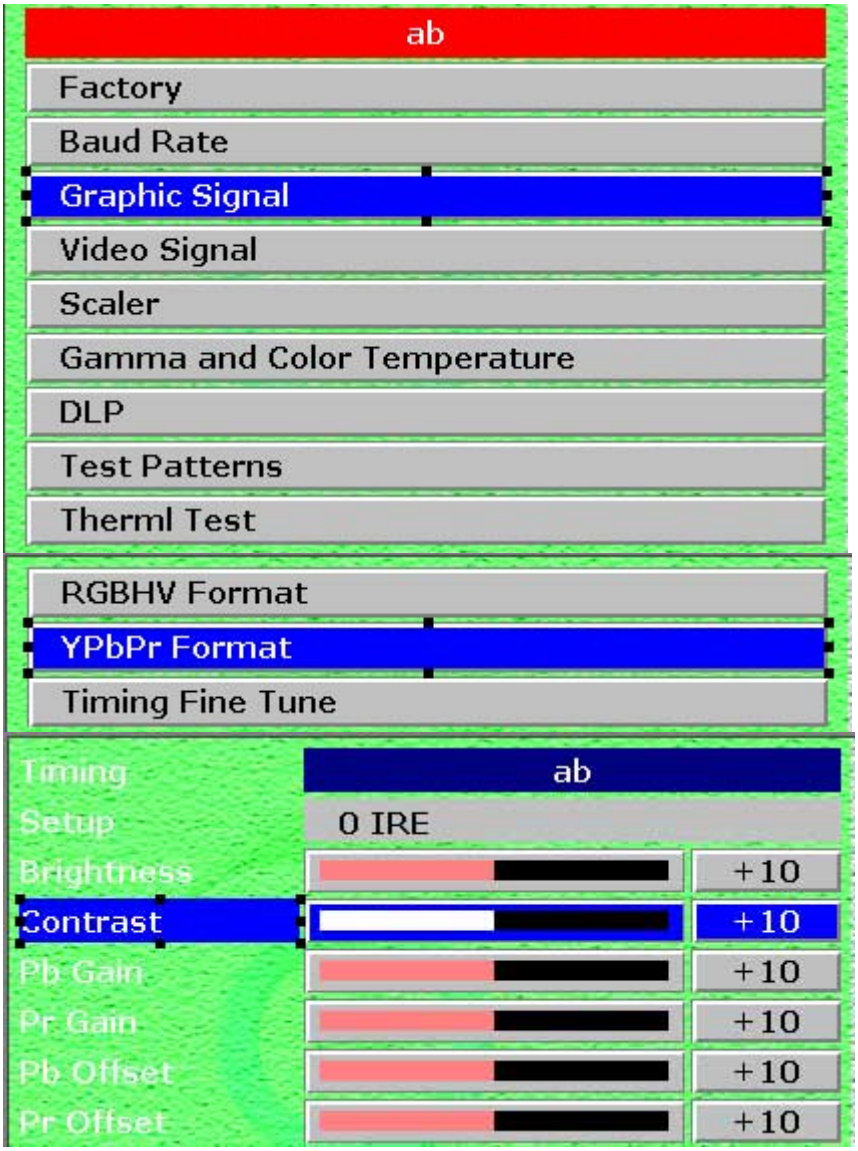

As Video Color Temperature 1
As Video Color Temperature 2
As Video Color Temperature 3
As Video Color Temperature 4
As Video Color Temperature 5
Restore Color Temperature 0-5 To Default
As Data Color Temperature 1
As Data Color Temperature 2
As Data Color Temperature 3
As Data Color Temperature 4
As Data Color Temperature 5
Restore Color Temperature 0-5 To Default

5. ADC setting

5.1 YPbPr input

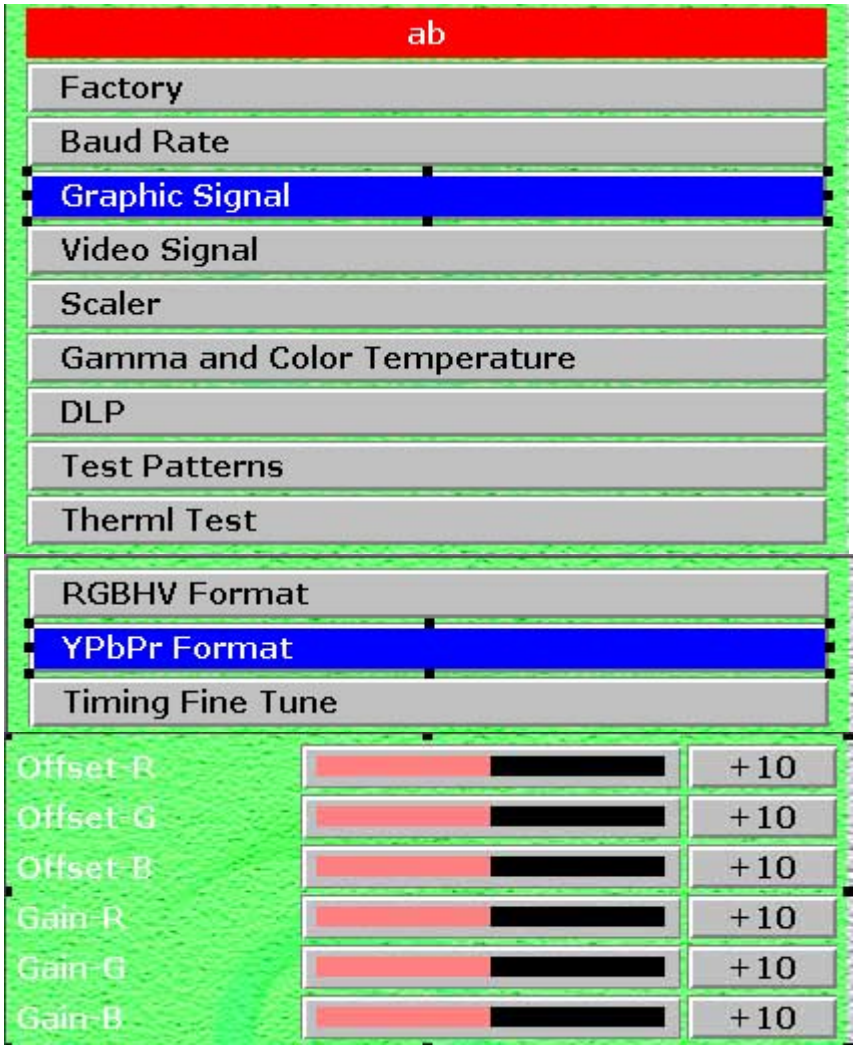
- Timing: 480P
- Pattern: SMPTE (DVD Disk)
- Switch 0 or 7.5 IRE (Projector and DVD recorder's IRE must be synchronized)
- The ideal environment to adjust the brightness and contrast value is in the dark room.
- Adjust the ADC brightness value to make the left column to darkest to get the best brightness result.
- There is no adjustment for contrast, use the default value.
- Adjust Pb offset and Pr offset to all step color is same.




ab
Factory
Baud Rate
Graphic Signal
Video Signal
Scaler
Gamma and Color Temperature
DLP
Test Patterns
Therml Test
RGBHV Format
YPbPr Format
Timing Fine Tune
Timing
ab
Setup
0 IRE
Brightness
+10
Contrast
+10
Pb Gain
+10
Pr Gain
+10
Pb Offset
+10
Pr Offset
+10

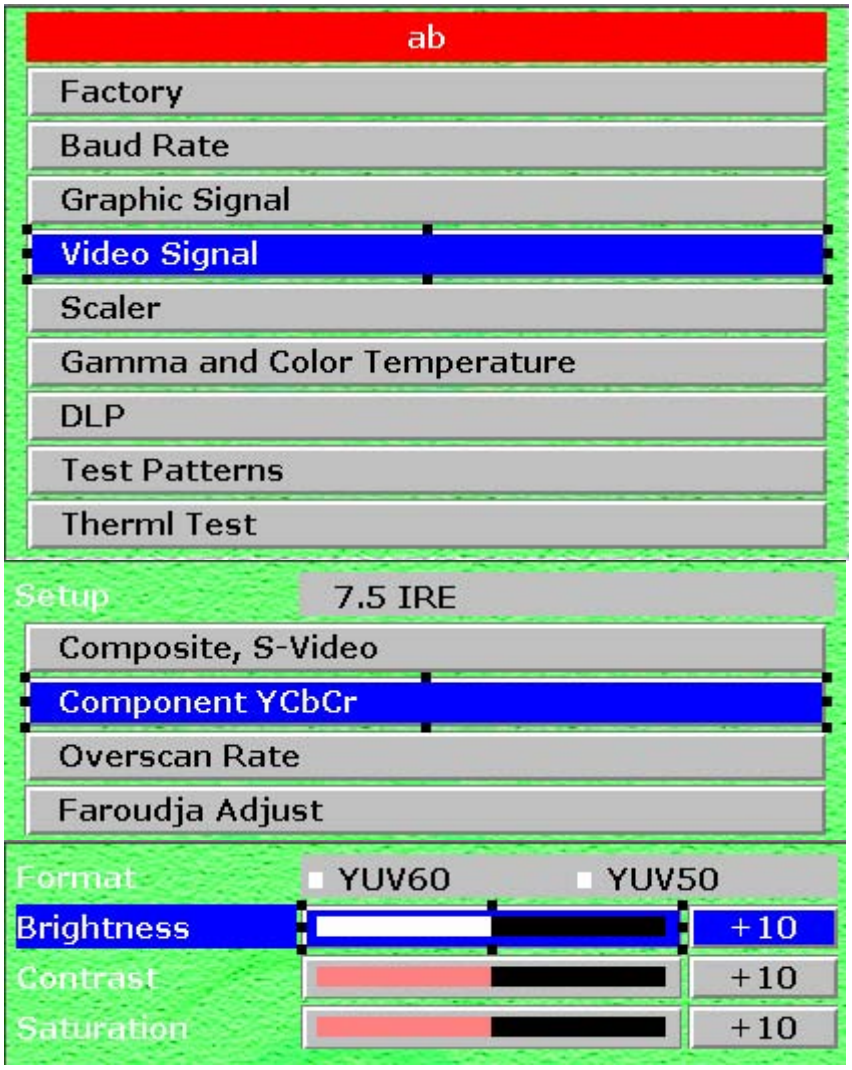
5.2 GBRHV input

- Timing ：XGA
- Pattern ：SMPTE (DVD Disk)
- The ideal environment to adjust the brightness value is in the dark room.
- Offset-R, Offset-G, Offset-B
- Adjust the ADC Offset-R, Offset-G, Offset-B value to make the left column to darkest, to get the best brightness result.
- There is no adjustment for contrast, use the default value.



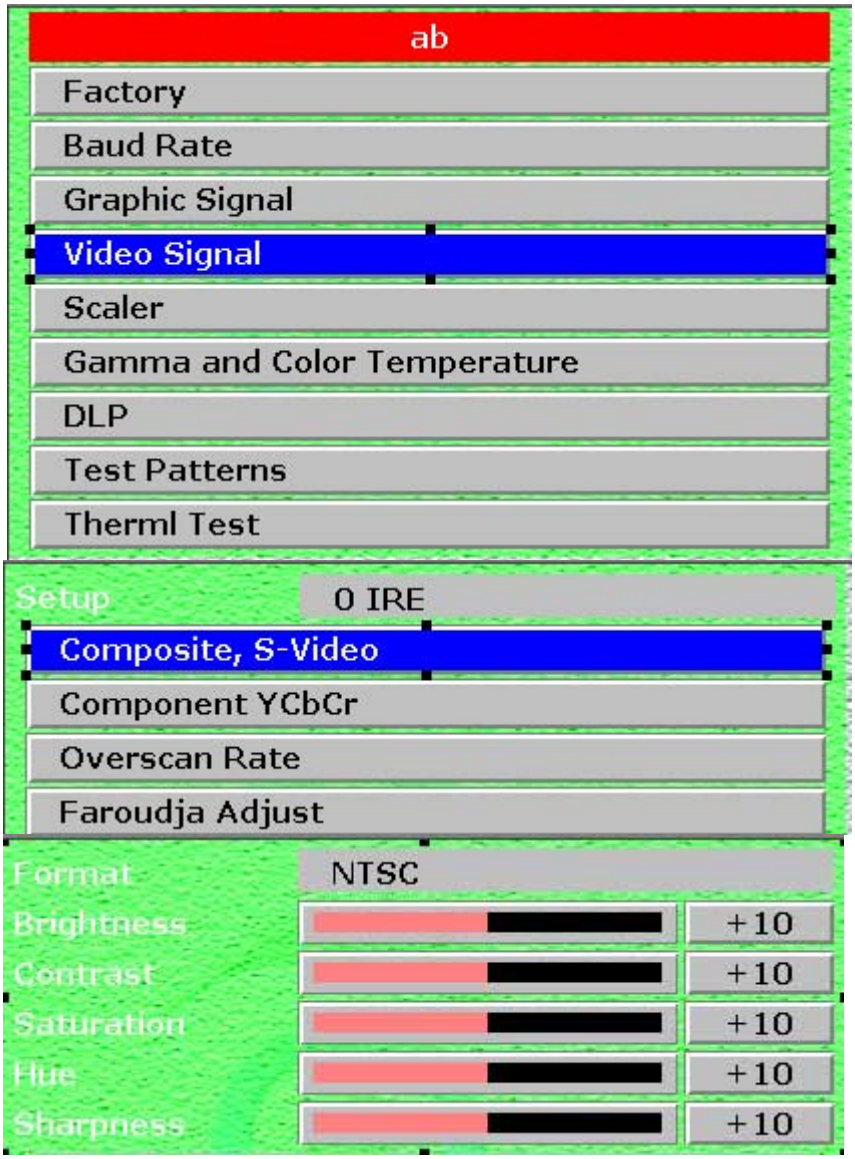
5.3 YCbCr input

- Timing ：480i
- Pattern ：SMPTE (DVD Disk)
- Switch 0 or 7.5 IRE (Projector and DVD recorder's IRE must be synchronized)
- The ideal environment to adjust the brightness and contrast value is in the dark room.
- Adjust the ADC brightness value to make the left column to darkest, to get the best brightness result.
- There is no adjustment for contrast, use the default value.



5.4 S-Video input

- Timing ：480i
- Pattern ：SMPTE (DVD Disk)
- Switch 0 or 7.5 IRE (Projector and DVD recorder's IRE must be synchronized)
- The ideal environment to adjust the brightness and contrast value is in the dark room.
- Adjust the ADC brightness value to make the left column to darkest, to get the best brightness result.
- There is no adjustment for contrast, use the default value.



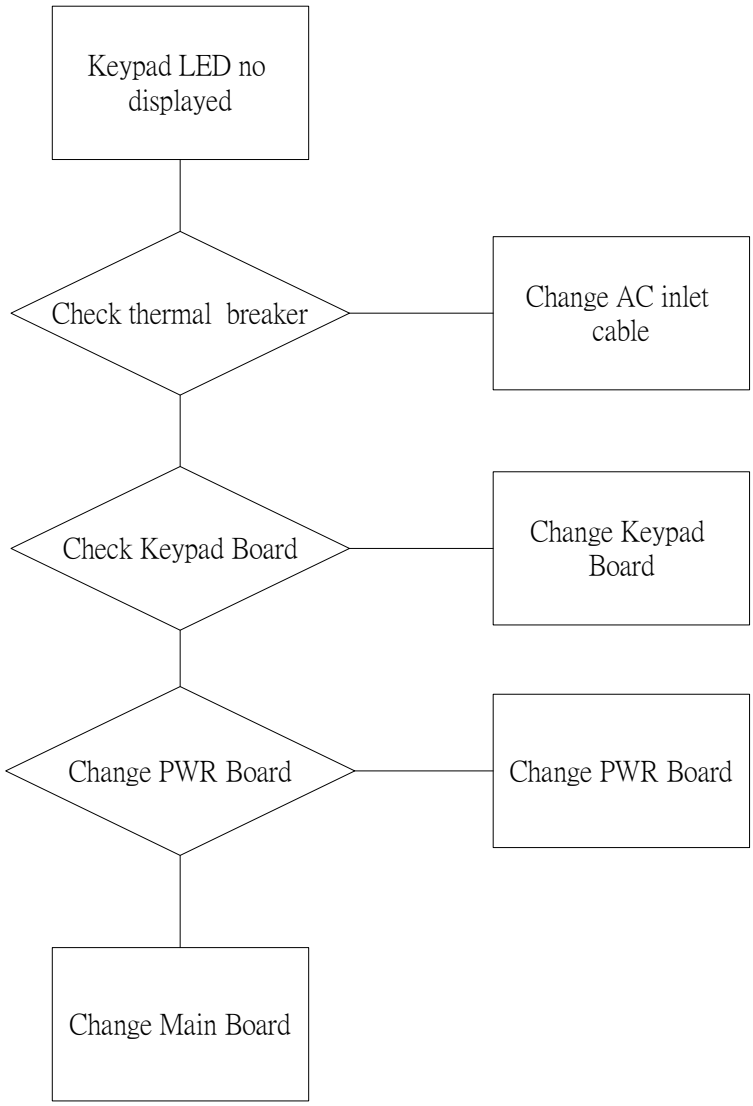
6. Trouble Shooting Guide

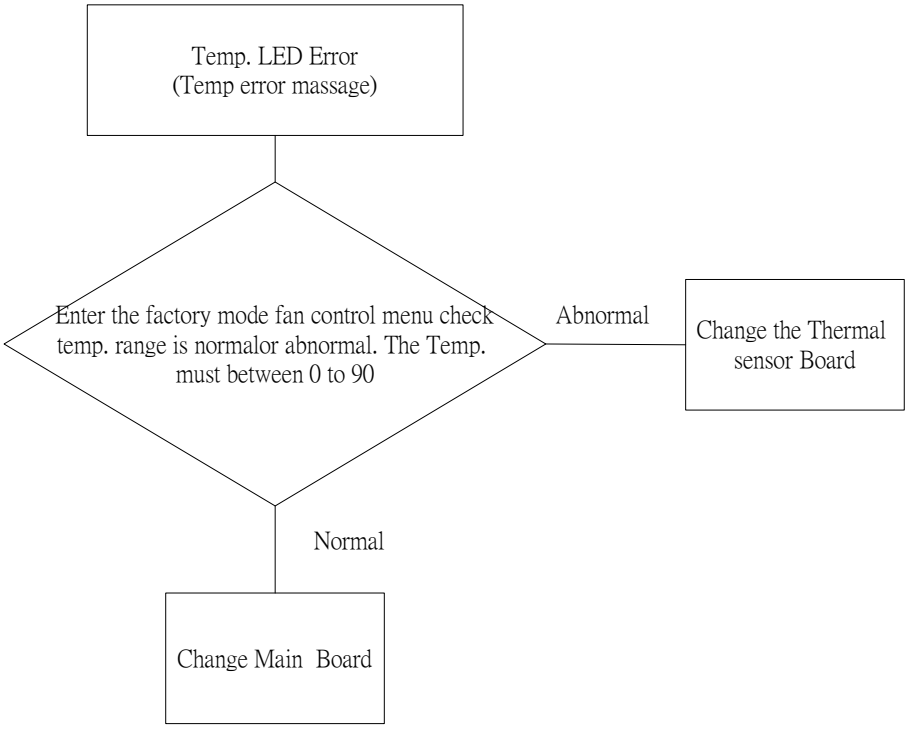
6.1. System LED Message

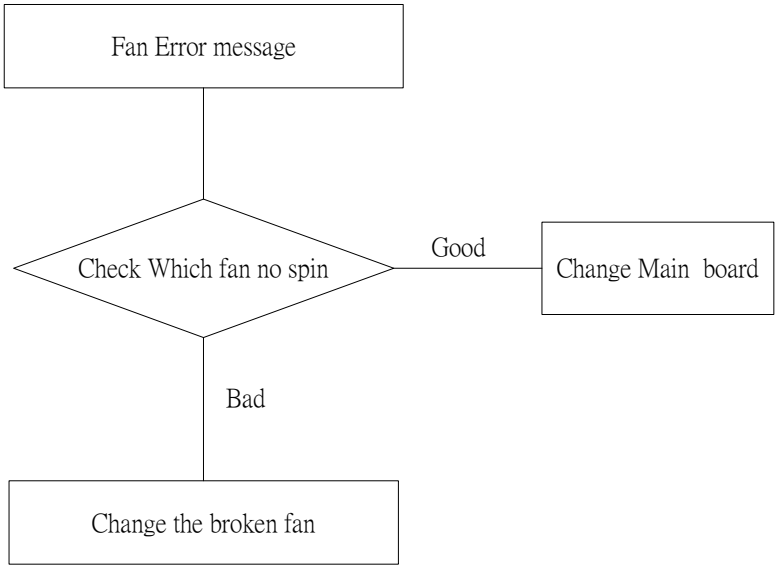
Thermal error									Can turn on again ?	After AC SW/off on	Note
		step 1	step 2 (cooling)			step 3 (finish cooling)					
			Power	Lamp	Temp	Power	Lamp	Temp			
1	intake sensor over heat	Shutdown	blink orange	Off	RED	Orange	Off	RED	YES	RESET	
2	lampbox sensor over heat	Shutdown	blink orange	Off	RED	Orange	Off	RED	YES	RESET	
Lamp error											
		step 1	step 2 (cooling)			step 3 (finish cooling)					
			Power	Lamp	Temp	Power	Lamp	Temp			
1	doorlock open	Shutdown	AC Power off directly						NO	RESET	
2	lamp NG	Shutdown	blink orange	Red	Off	orange	Red	Off	YES	RESET	
3	lamp lit error	Shutdown	blink orange	Red	Off	orange	Red	Off	YES	RESET	cooling 1 minutes

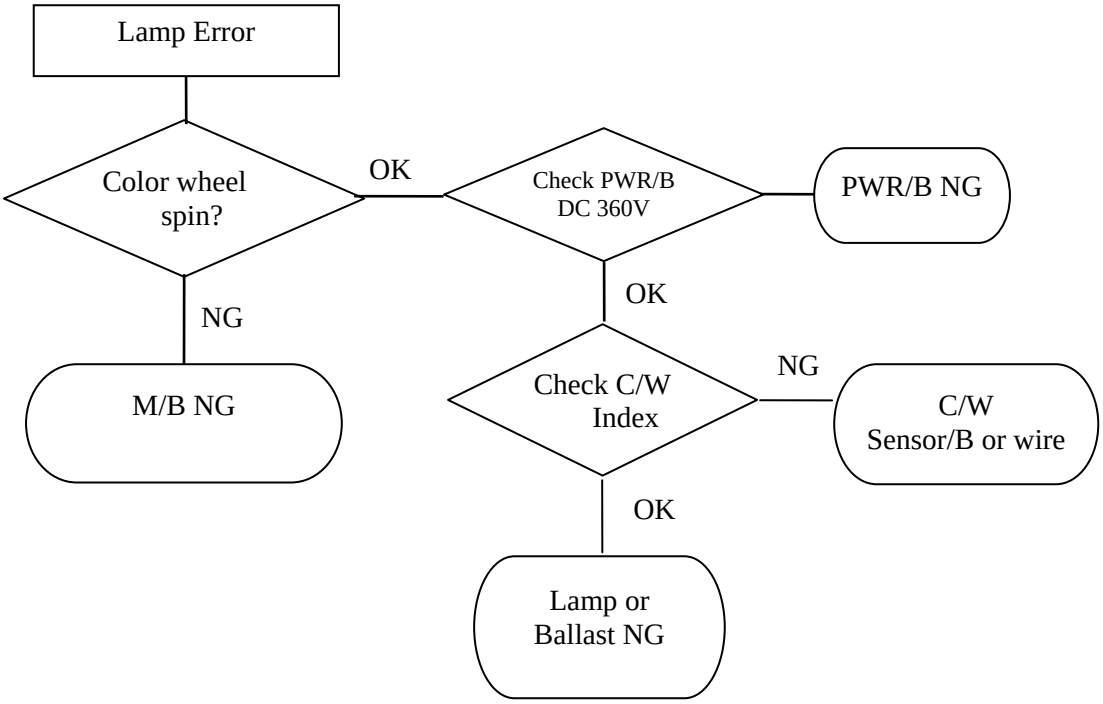
Fan failure (CPU will check after lamplit)									Can turn on again ?	After AC SW/off on	Note
			Power	Lamp	Temp						
1	Fan stop (check fan status)	Shutdown	orange	blink red	blink red				NO	RESET	
2	no feedback	Shutdown	orange	blink red	blink red				NO	RESET	
3	intake sesor open	Shutdown	orange	blink red	blink red				NO	RESET	
4	lampbox sesor open	Shutdown	orange	blink red	blink red				NO	RESET	
5	fan control IC I2C read fail	Shutdown	orange	blink red	blink red				NO	RESET	error 5 times shutdown
IIC error											
			Power	Lamp	Temp						
	IIC fail	Shutdown	NA						NO	RESET	

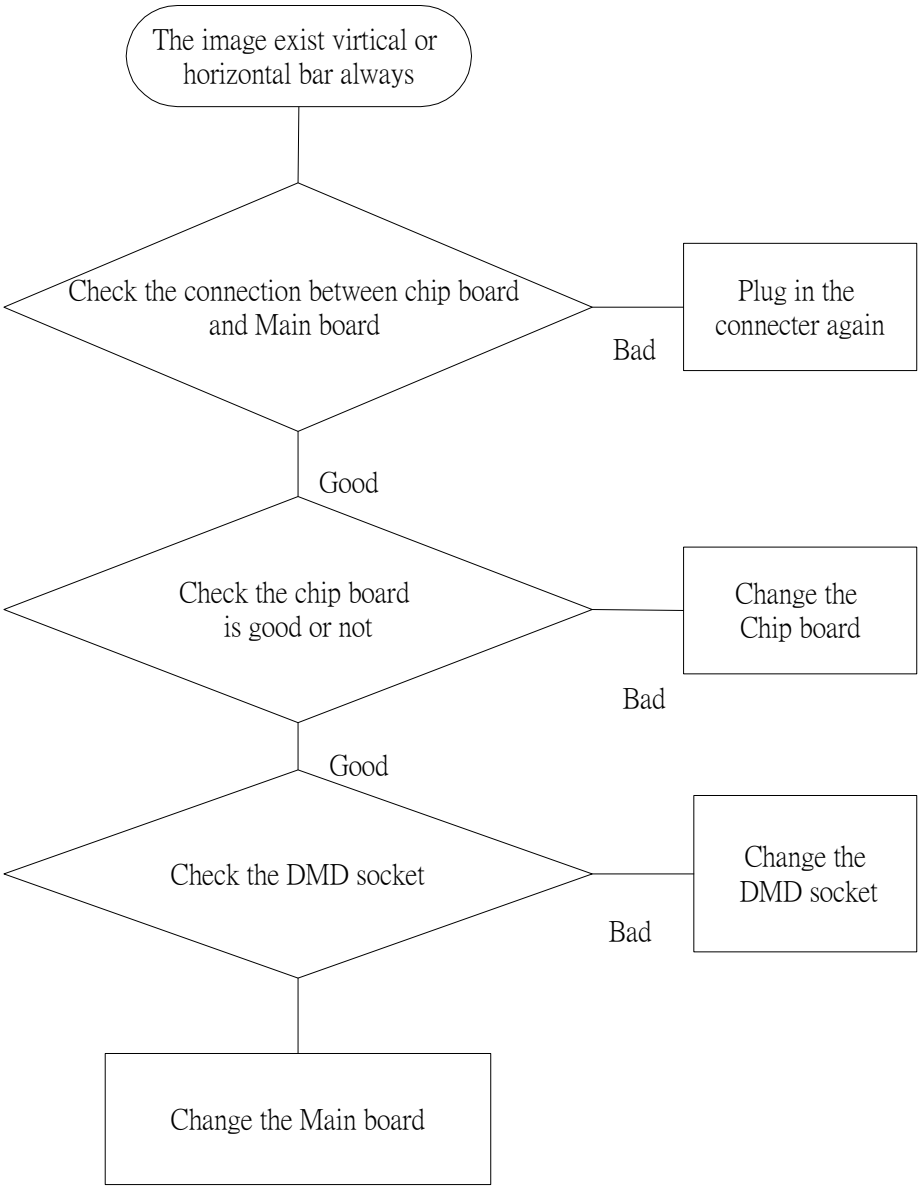
Lamp life warning											Note
			Power	Lamp	Temp	OSD message			Can turn on again ?	After AC SW/off on	
	Lamp hour (P-ON) 1950 ~ 2000	No Action									
	Lamp hour (P-OFF) 1950 ~ 2000	No Action									
	Lamp hour (P-ON) 2000 ~ 2980		green	blink Red	off	Lamp exceed service hours.			YES	NO	
	Lamp hour (P-OFF) 2000 ~ 2980		orange	blink Red	off	NA			YES	NO	
	Lamp hour (P-ON) 2980 ~ 3000		green	Red	off	Please change the lamp. The rest lamp life is less than 20 hours.			YES	NO	
	Lamp hour (P-OFF) 2980 ~ 3000		orange	Red	off	NA			YES	NO	
	Lamp hour (P-ON) over 3000		green	Red	off	Please change the lamp! Press "Power On/Off" or "Exit" to shutdown.			NO	NO	
	Lamp hour (P-OFF) over 3000		orange	Red	off	NA			NO	NO	


Keypad LED no displayed
Check thermal breaker
Change AC inlet cable
Check Keypad Board
Change Keypad Board
Change PWR Board
Change PWR Board
Change Main Board


Temp. LED Error
(Temp error massage)
Enter the factory mode fan control menu check temp. range is normalor abnormal. The Temp. must between 0 to 90
Abnormal
Change the Thermal sensor Board
Normal
Change Main Board

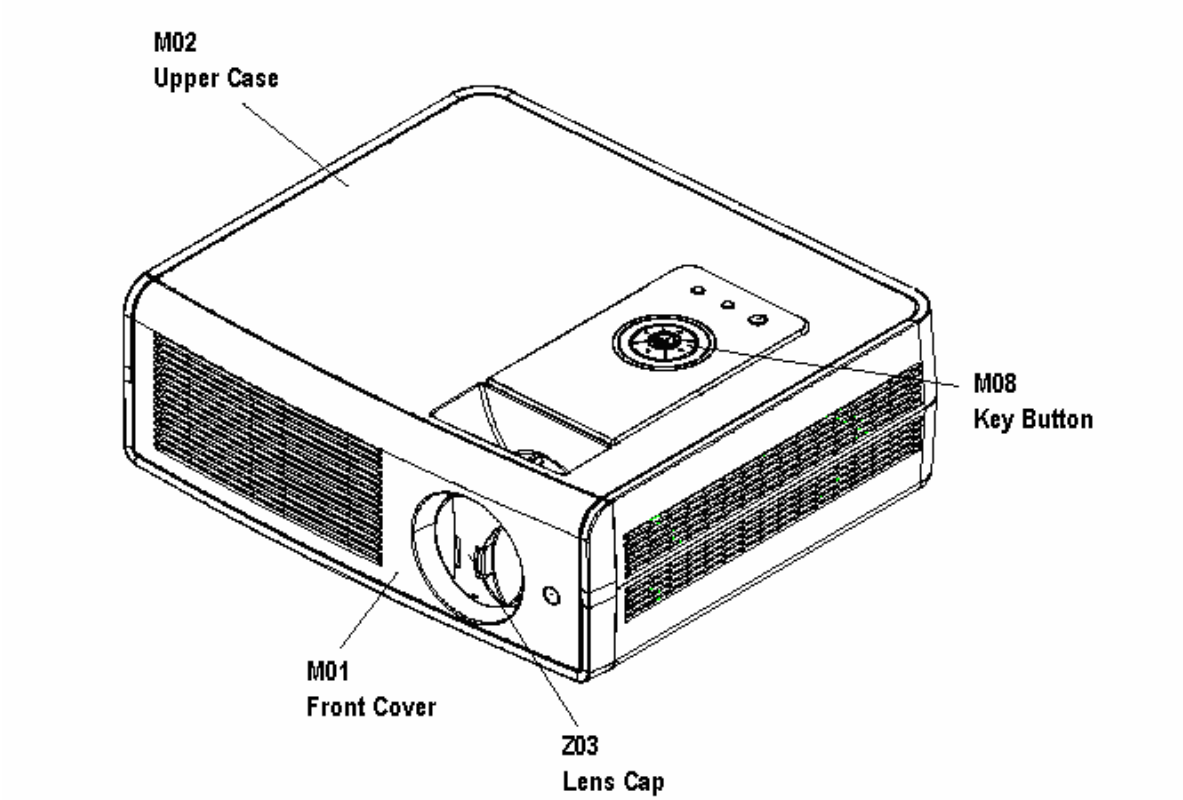

Fan Error message
Check Which fan no spin
Good
Change Main board
Bad
Change the broken fan

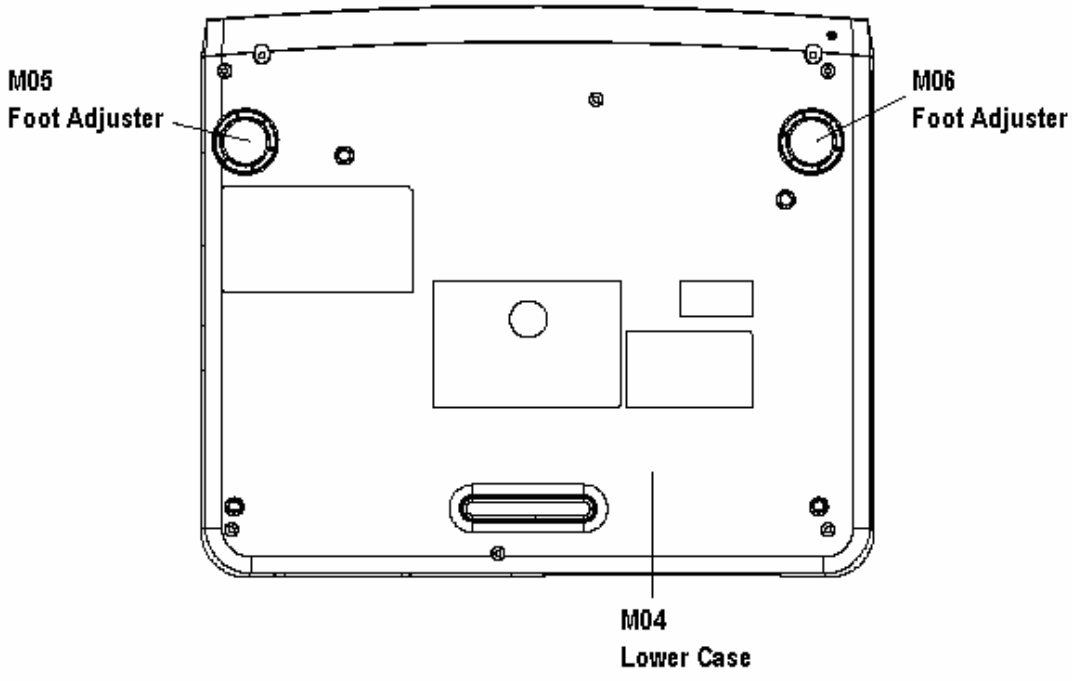

Lamp Error
Color wheel spin?
OK
Check PWR/B DC 360V
PWR/B NG
NG
M/B NG
OK
Check C/W Index
NG
C/W Sensor/B or wire
OK
Lamp or Ballast NG


The image exist virtical or horizontal bar always
Check the connection between chip board and Main board
Bad
Plug in the connecter again
Good
Check the chip board is good or not
Bad
Change the Chip board
Good
Check the DMD socket
Bad
Change the DMD socket
Change the Main board

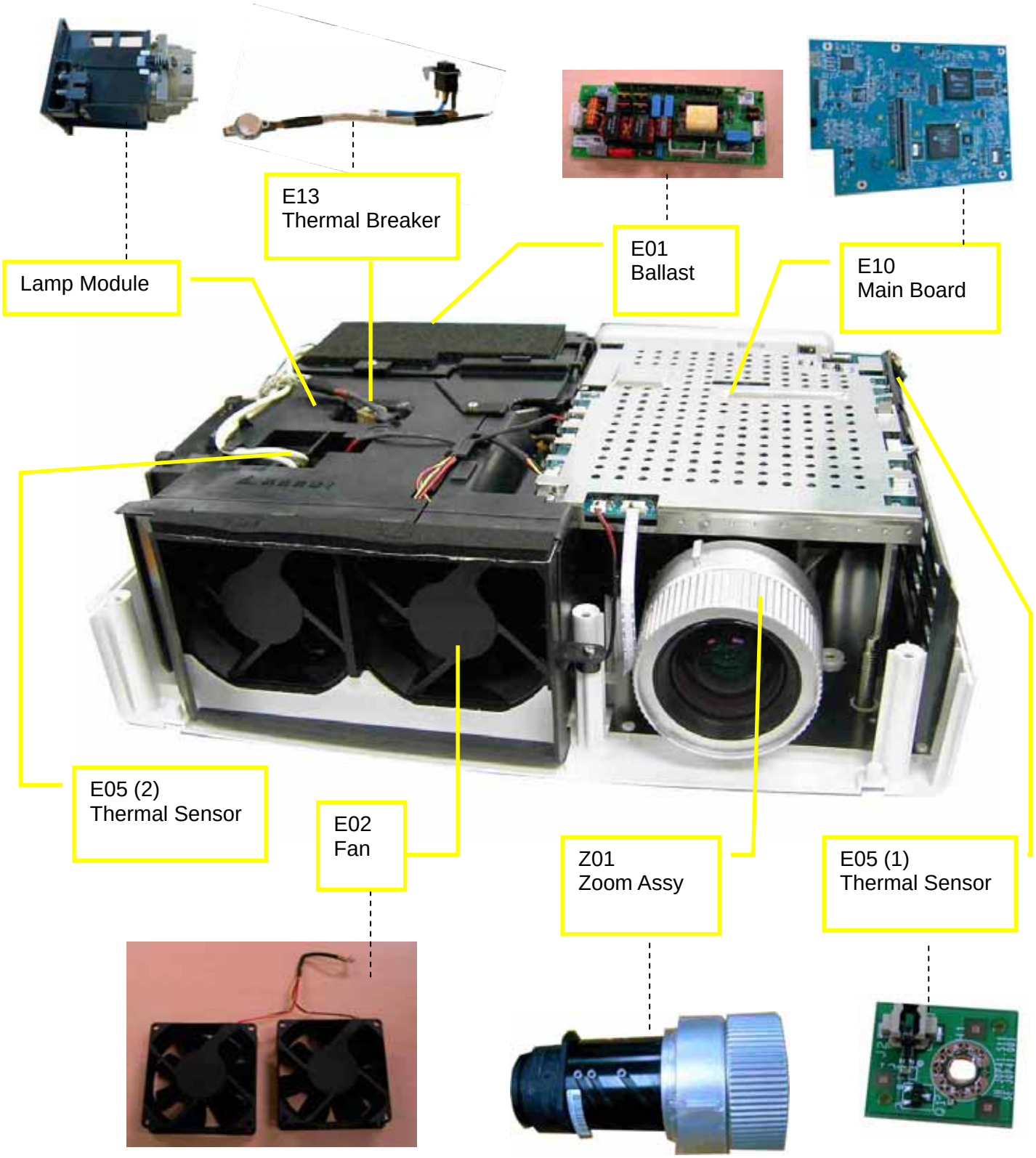
Appendix A: Exploded View

1. The appearance of projector





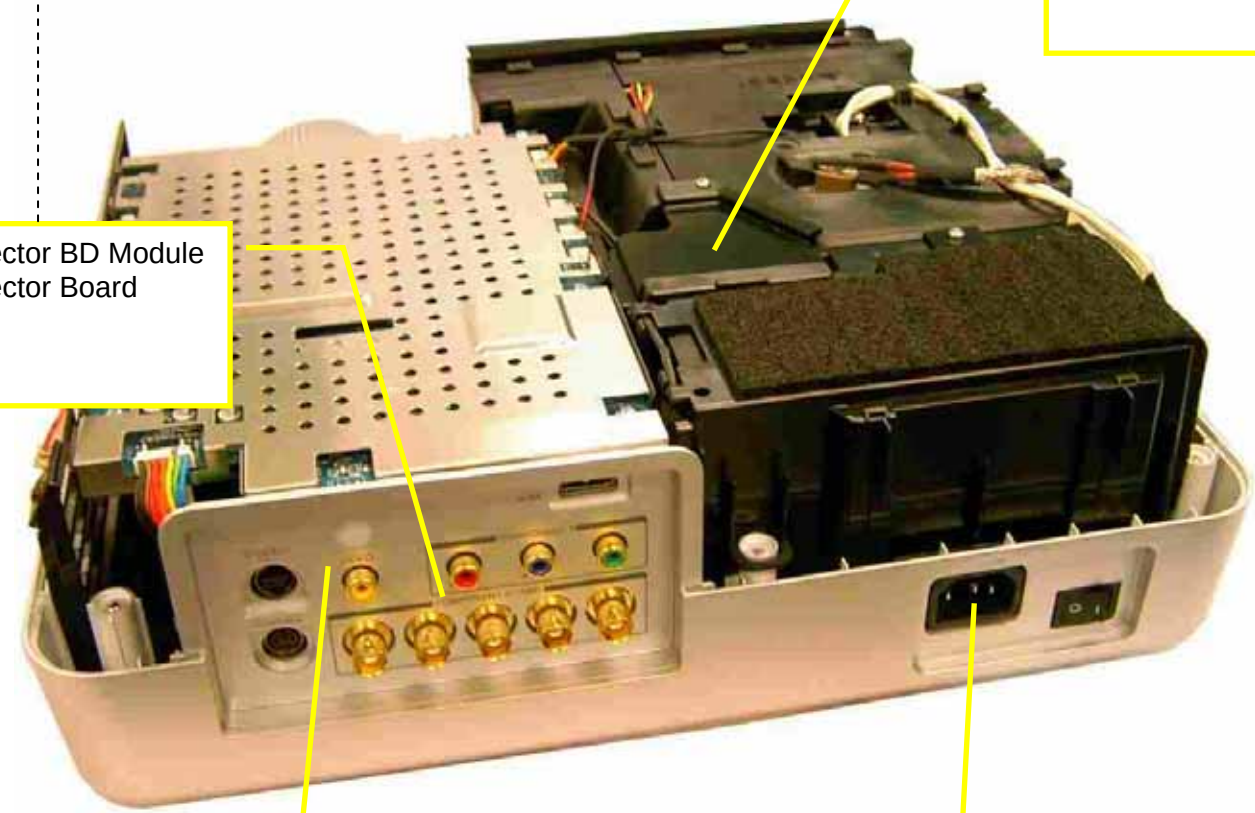
2. The front side of projector



3. The rear side of the projector

Blower
E14

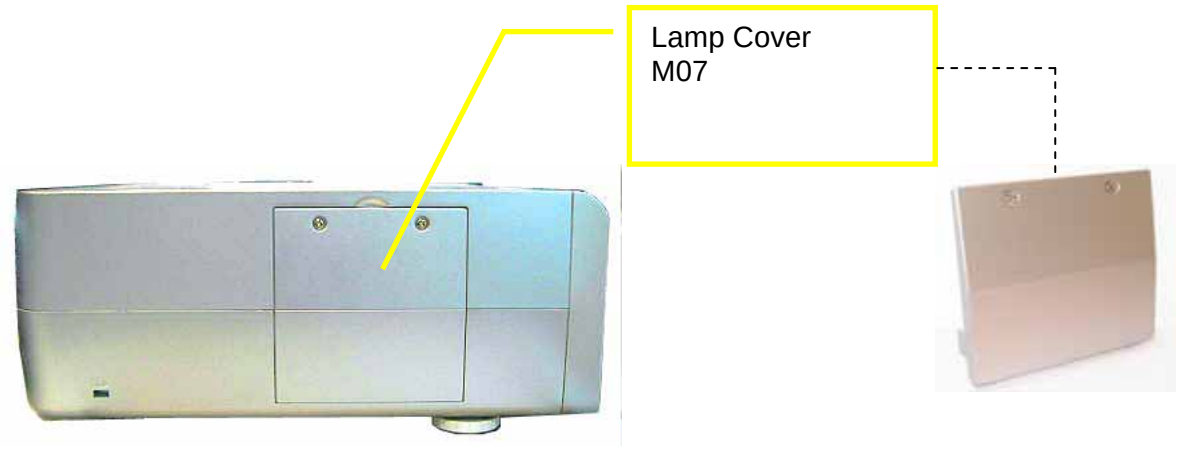
Connector BD Module
Connector Board
E04



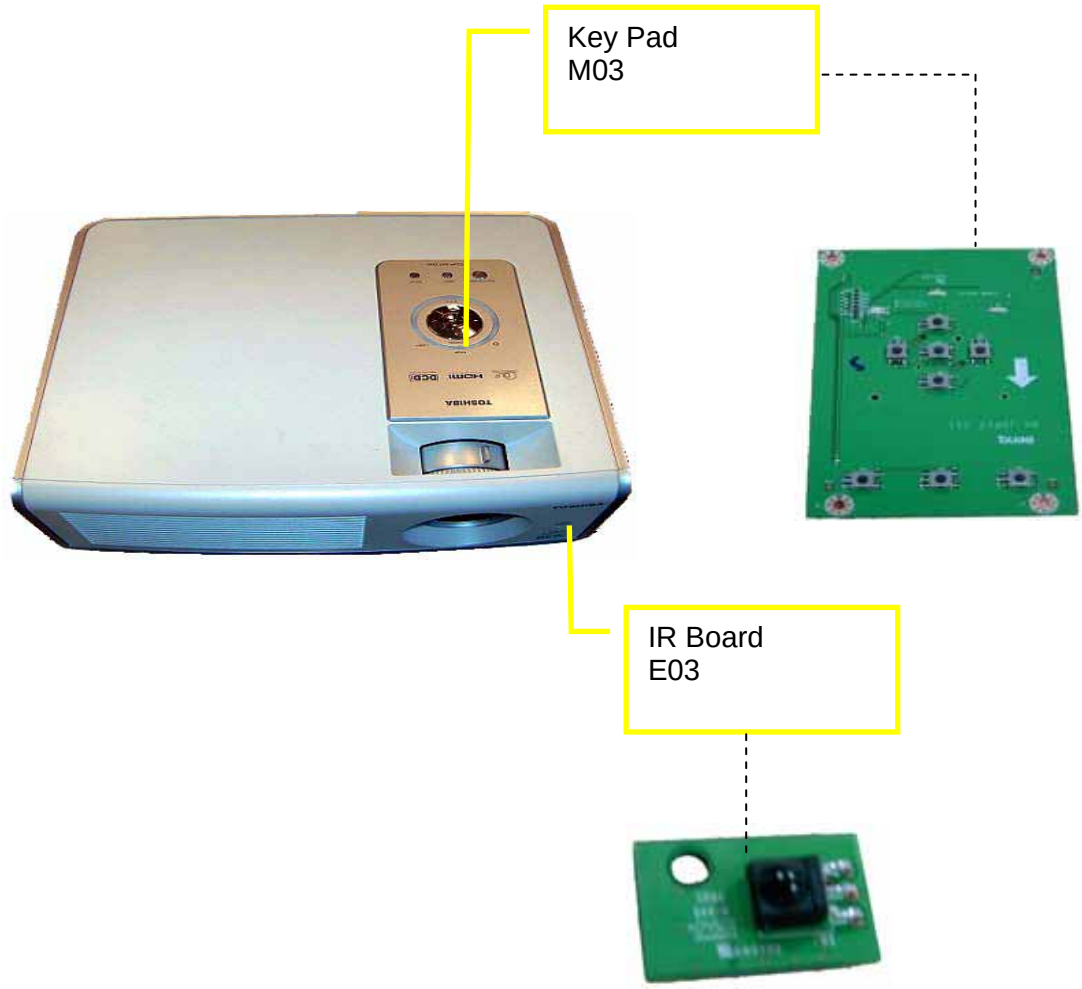
Terminal Cover
E12

Main power supply
E09

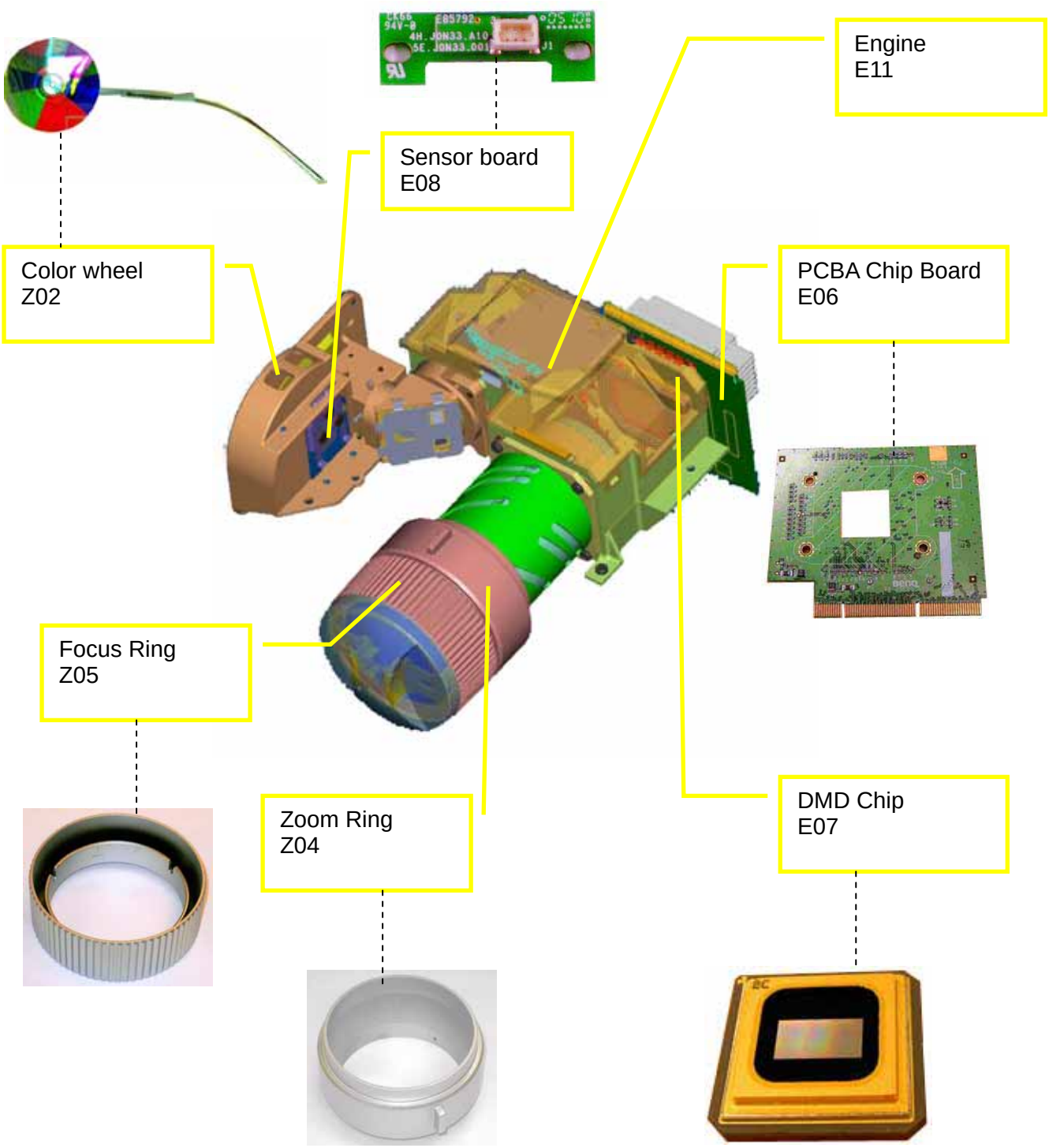
4. Side view of the projector



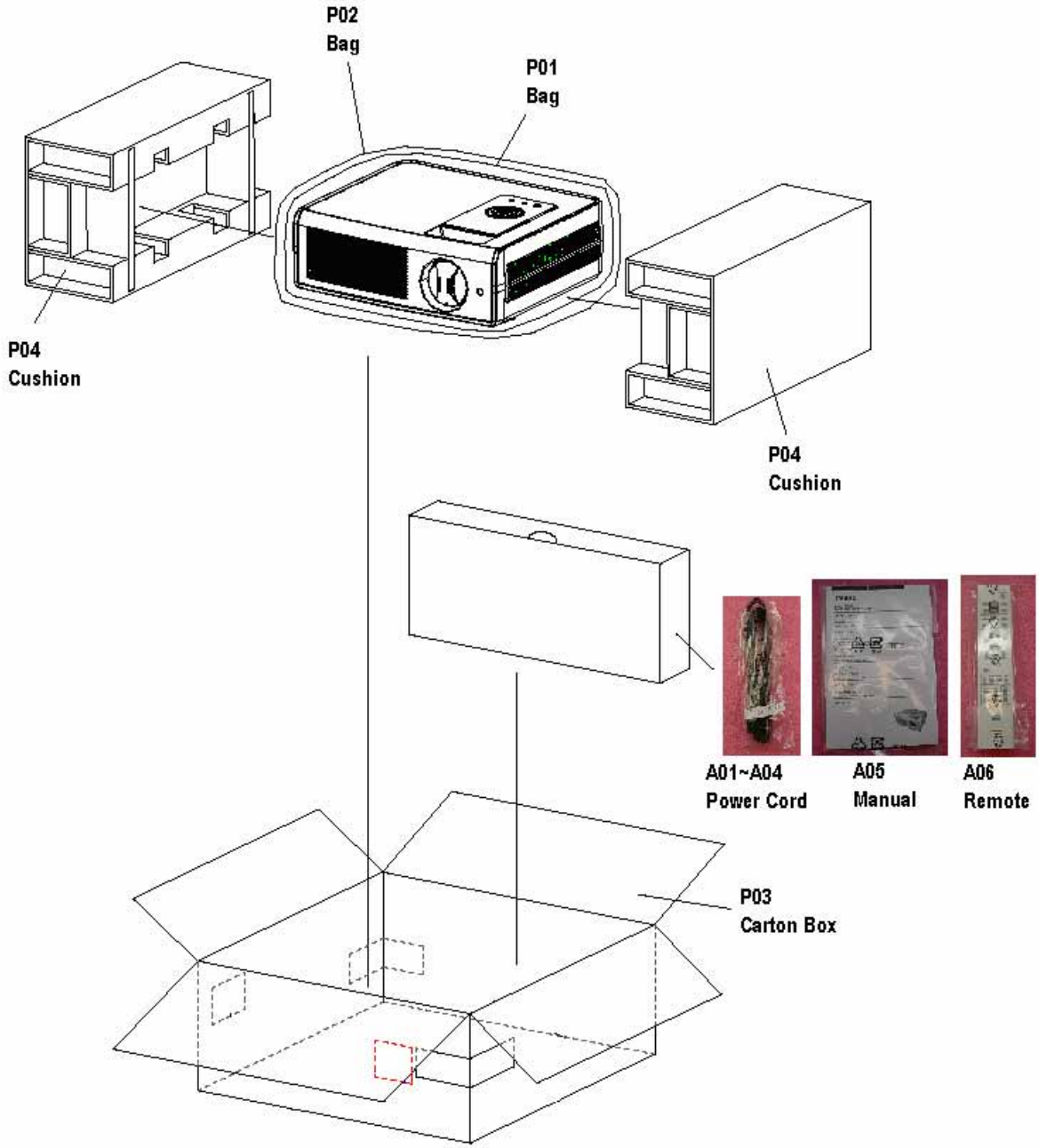
5. Top View of the projector



6. Optical Unit



7. Packing Materials and Accessory



Appendix B: Spare Parts List

Seq.	Part Number	Location Number	Description
1	23587519	E01	LAMP POWER ASSY, BALLAST, TDP-MT700
2	23587520	E02	FAN, 1208
3	23587521	E03	PC BOARD ASSY, IR BD, TDP-MT700
4	23587522	M01	FRONT COVER ASSY, TDP-MT700
5	23587523	M02	TOP COVER ASSY, TDP-MT700
6	23587524	M03	PC BOARD ASSY, KEY PAD, TDP-MT700
7	23587530	E04	PC BOARD ASSY, CONNECT, TDP-MT700
8	23587531	E05	PC BOARD ASSY, SENSOR, TDP-MT700
9	23587532	E06	PC BOARD ASSY, PE7700, TDP-MT700
10	23587533	Z01	ZOOM ASSY
11	23587534	E07	DIGITAL MICRO MIRROR DEVICE, HD2 VALUE
12	23587535	E08	PC BOARD ASSY, SNS-B, TDP-MT700
13	23587541	Z02	COLOR WHEEL ASSY, DIA50 PE7700 PRPDISC. TDP-MT700
14	23587542	E09	PC BOARD ASSY, LAMP, TDP-MT700
15	23587543	M04	LOWER COVER ASSY, TDP-MT700
16	23587544	E10	PC BOARD ASSY, MAIN, TDP-MT700
17	23587545	A01	AC CORD, 10A, 250V, EUR, TDP-MT700
18	23587547	A03	AC CORD, 10A, 125V, US, TDP-MT700
19	23587548	A04	AC CORD, 13A, 250V, UK, TDP-MT700
20	23587549	P01	BAG, PE7700
21	23587550	P02	BAG, PE, MT700
22	23587551	P03	CARTON BOX, TDP-MT700
23	23587552	P04	CUSHION PAPER
24	23587553	A05	OWNER'S MANUAL, TDP-MT700
25	23587554	A06	REMOCON HAND UNIT, T208
26	23587555	E11	OPTICS BLOCK ASSY, TDP-MT700
27	23587556	Z03	LENS CAP, TDP-MT700
28	23587557	M05	FOOT ASSY, ADJ, R, PDT-MT700
29	23587558	M06	FOOT ASSY, ADJ, L, TDP-MT700
30	23587559	M07	COVER ASSY, LAMP, TDP-MT700
31	23587560	Z04	ZOOM RING, TDP-MT700
32	23587561	Z05	FOCUS RING, TDP-MT700
33	23587562	E12	COVER, TERMINAL, TDP-MT700
34	23587563	E13	SWITCH, LAMP
35	23587564	E14	FAN, MOTOR
36	23587565	M08	BUTTON ASSY, KEY

Appendix C: OSRAM Lamp Date Code

Year						
Month		**2005**	**2006**	**2007**	**2008**	**2009**
	01	qd1	qt1	qh1	qa1	qw1
	02	qd2	qt2	qh2	qa2	qw2
	03	qd3	qt3	qh3	qa3	qw3
	04	qd4	qt4	qh4	qa4	qw4
	05	qd5	qt5	qh5	qa5	qw5
	06	qd6	qt6	qh6	qa6	qw6
	07	qD1	qT1	qH1	qA1	qW1
	08	qD2	qT2	qH2	qA2	qW2
	09	qD3	qT3	qH3	qA3	qW3
	10	qD4	qT4	qH4	qA4	qW4
	11	qD5	qT5	qH5	qA5	qW5
	12	qD6	qT6	qH6	qA6	qW6

T O S H I B A C O R P O R A T I O N
1-1, SHIBAURA 1- CHOME, MINATO - KU, TOKYO 105 - 8001, JAPAN